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RECORD

F. R. Fosberg

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Malaya
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1956 Malaya

1

April 20 - The road from Kuala Lumpur to Seremban is almost entirely through rubber plantations.

Many of these are mature, but some are quite young. There is considerable replanting going on. The old trees are poisoned, and when dead, cut for firewood.

This accounts for the areas of whitened skeletons seen from the plane on April 18.

The dark green trees in close rows, seen then, are also rubber, planted in "hedge" style, with the trees very close together in rows, or double rows, with wider spaces between the rows. This is supposed to save labor in tapping.

Generally the spacing is so close that the crowns touch all around. The cleanliness of cultivation varies in different estates. Formerly clean cultivation was considered best. Now cover crops, weeds, selected weeds, etc. are left on the ground on many estates. An argument for clean cultivation is that weeds or

other plants which come as high as the tapping panels seem to encourage fungus attack in these areas.

At this season the trees are in somewhat less than full leaf, making them a rather uneven grayish green. Later they are much darker green, and cast a denser shade.

Planting on steep hills is prohibited unless terracing is undertaken. This is the contouring seen from the plane.

Just before reaching Seremban the road crosses a range of hills which are covered by forest reserve. This is rather nearer hill dipterocarp forest, even though it is at a very low altitude for this. It is an example of the depression of altitudinal zones seen in coastal and isolated mountains and hills. It has been rather degraded by logging. A scattering of *Shorea curtisii* is visible ^{marked by} ~~because of~~ a gray color, from a distance.

Scattered here and there in low spots all the way to Seremban are clumps and small patches of *Metroxylon*. Whether this indicates swamps is not always obvious. It may be used principally for thatch, though the sago also is used, at least locally.

Between Seremban and Port Dickson, again rubber estates predominate. On a low range of hills there is young forest, very tangled, perhaps up to 10 m. high. This was cleared by the Japanese during the war. It has grown up to "belukar" or second-growth but with a good crop of dipterocarp seedlings nursed by the secondary vegetation. Several miles north of Port Dickson mangroves appear in low spots. Otherwise low places are occupied by rice, or if not too low, by rubber, which seems to do well on low flat rather poorly drained soil.

4

1956 Malaya

April 20 - Sungai Menyala
Forest Reserve, 6 mi. southeast
of Port Dickson

Primary rain forest, lowland
dipterocarp type, on 'low flat'
ground

36925

Carinta

4

common locally in

1

26

Carinta

common locally in

3

27

Ixora

common in openings in

A sample plot in this
reserve seems to be partly,
at least, virgin lowland
dipterocarp forest. The
trees over 4" dbh. have been
enumerated, numbered, and
identified.

The ground is flat,
with no marked irregu-
larity. The soil is a
yellowish gray brown at
the surface, ~~it~~ feels like a
fine silt with a little fine
sand. Surface covered by
a thin, rather continuous
litter of dead leaves. No marked

Rainfall
at
Port Dickson
80-90",
well
distributed.

Negri Sembilan ^{center} 5
Cape

5 m

prostrate, extensively
creeping herb; peduncles
erect; fruit black,
glossy, fleshy.

fruiting stems erect
from creeping rhizome;
fruits purple-black,
glossy.

shrub 1-2.5 m. tall;
flowers deep orange, on
red panicles.
"bunga siantan"

darkening by humus.
It is apparently fairly
deep.

This forest has an
irregular canopy, in
places dense, in places
rather open, about 30-35 m.
high. Taller trees are
in groups, reaching
considerably taller.

The canopy trees are
from 3-5 dm. dbh., the
emergents larger, ^{about 1 m.}
enormous 'Shorea parviflora'

seen 15th ~~Ind~~ Indian
above buttresses. at its
base was a huge mound
of earth about 1.5 m. high
around and between the
buttresses. This turned
out to be a termite nest.
Most of the large trees
here are buttressed.

An irregular second
story seems to be about
20 m. of trees 1-2 dm. dbh.

A definite shrub layer,
2-5 m. high, stems about
0.5-1 m. apart, easy to
walk through. A few
young rattans, mostly
still in rosette stage,
rather common. Melastoma-
ceae common also Ixora.

Locally there is a sparse
but very definite ground
layer of Carintia (2 spp.),
a few ferns, and seedlings
of various trees. These latter
may persist in a dormant
stage a few dm. tall or less,
for a number of years,
shooting up in an opening
occurs to let in light.

In a small opening, at
least 10 years old, were
saplings of Dipterocarpace
from 3 to 6 m. tall, but

Big Trees
Krompharia
Shorea leprosula
Shorea acuminata
Shorea manifestis
Dipterocarpus crinitus
Dipterocarpus venulosus

rather few of them.
Also Ixora, and a big
Sansevieria. This was
essentially still an
opening, after 10 years,
with the ground between
the bushes quite bare.
In an opening caused
by fall of a large tree,
more recently, there
were also a few fairly
large saplings, many
smaller ones, some
Ipomoea and other weedy
things.

Lianes are not
especially abundant
here but are sometimes
very large, one seen
15-20 cm. diam.

After these forests are
logged out, the remaining
trees are frill-girdled
and then poisoned with
sodium arsenite. It
takes them up to 1 year, or
even 18 months, to die, and
one ~~year to rot~~ to five years
to rot and fall down.
The tangle of climbers and
saplings which follows is
open beneath in 3-5 years,
and may be 10-12 m. high.

April 20 - About 6 miles southeast of Port Dickson, along coast road.

Along the inner edge of the mangrove swamp coconuts have been planted, even a hundred yards or more out into the mangroves. ~~which~~ There has been an attempt to drain the swamp by ditching. The coconuts look very sick, with small crowns of yellow leaves. In the swamp, here, are bushes of *Sumnitzera littorea* ^{1-1.5 m. tall} and *Pluchea indica*, small clumps of *Acrostichum aureum*, patches of *Ischaemum* and a fine wiry grass, possibly a form of *Sporobolus virginicus*.

Nearer to the sea, a mile or less along the road south, where the swamp is better developed, the trees larger, *Sumnitzera*, *Avicennia* and *Rhizophora* make up the vegetation. The trees here are to 5 m. tall.

Large spaces between irregular, are filled with steep, conical mounds of

dried mud to 5-6 dm. high, each with a hole in the top. They are said to be made by crabs.

Examined beach and rock along coast 5 miles south of Port Dickson.

The beach is of fine quartz sand. Casuarina trees are common.

Scaevola sericea locally forms a strip to 2 m. high, with some *Ximenia americana*. *Ischaemum muticum*, *Sporobolus virginicus*, and *Sporobolus brasiliensis* are common along the beach.

On the rocks, which are like a thick lateritic iron pan (see sample), there are thickets of *Hibiscus tiliaceus*, also *Eugenia* sp. On bare spots *Gleichenia linearis* comes down to within a few feet of high tide mark.

Some of the same rock forms a reef a few meters out from the beach.

This is said to be the only place where there is sandy

1956 Malaya - Negri Sembilan
beach along this whole coast. It is a rather poor narrow beach.

In intervals in the beach there is a strip of mangroves. Here the outer belt is mainly *Sonneratia*, which actually grows out in the shallow water on sand bottom. The *Sonneratia* is tall and spirelike and lighter colored than ordinary mangrove, and does not look exactly right from the air. Probably the outer belt seen from the air in Johore was *Sonneratia* rather than *Casuarina*.

April 21 - trip by road from Kepong to Fraser's Hill.

From Kepong to where the road branches off to follow up the Belangor River valley into the mountains is almost solid rubber plantation, with an occasional small patch of belukar.

In the river valley the steep walls are covered by a mixed forest, doubtless lowland dipterocarp forest at the base, changing to hill dipterocarp farther up.

In the valley bottom is belukar with a great deal of a slender bamboo. Small rubber plantations are scattered here and there where the land is reasonably level. The lower slopes are also belukar with bamboo. A small tree, *Pentaspadon officinalis*, is communally flowering in the belukar.

At milepost 47 good hill dipterocarp forest may be seen across the

valley, where the ridges are well marked by the gray crowns of *Shorea leprosella*, mixed with the yellowish ones of *Shorea leprosella*.

Going upward the belukar has more and more primary forest trees in it. Steep banks and cuts are covered by *Blechnum orientale*, *Gleichenia*, shrubs, vines, etc.

Upward, the forest near the road is very uneven. Big trees have been removed and there is much bamboo and tangled growth.

Near 2000' altitude the forest is less degraded. Large trees are mostly dipterocarps but there are some beautiful *Koompassia*.

From here up to 2800' hill dipterocarp forest is well developed. A beautiful arching bamboo with broad leaves fills the spaces where trees have been removed and clearings. There are some rattans and tree ferns. Ferns are more abundant upward.

Shorea platycladon
has a beautiful
straight trunk
and hemispherical
crown.

At the gap, 2800', and for some hundred feet higher there is still hill dipterocarp forest. Tree ferns are common.

Upward the forest is dense, with less bamboo. It is very mixed, stature seems a bit lower, climbers are more abundant.

The tree ferns seem to be more in ravines and in old disturbed places. *Dipteris* is common on cuts and slides, as well as *Blechnum* and *Gleichenia*. Other *Gleichenias* than *linearis* are coming in.

As milepost 61 is passed the forest takes on more and more the character of montane rainforest, but there still are plenty of dipterocarps. It has been much disturbed. By milepost 62 we are in montane forest.

There are landslides on steep slopes, covered by *Gleichenia*. Ferns generally, are now very conspicuous, as well as all kinds of epiphytes.

April 21 - Fraser's Hill.
Montane rain forest on ridge

36928

Nephrolepis

occasional on stumps and fallen logs

1 29 Cephacelis
rare

1 30 grass

common along trail

1 31 Hymenophyllum?
on tree trunks3 32 Lauraria
rare in1 33 Freziera?
common in

34 myrs.

in deep moss beside trail

2 35 Mussaenda
in undergrowth1 36 Panicum
rare along trail3 37 Chloranthus
occasional in1 38 Psychotria?
rare in1 39 Ardisia
rare in

1302-1408 m

shrub 1 m. tall; flowers
cream white.erect, single stems
or several together.

or small tree
large shrub, 5 m. tall;
flower clusters on
trunks; buds red, ^{outer} sepals
pink, inner ones white
with pink midrib,
petals white, recurved.

climbing; fruit immature.

fruit secund, crimson.

climber, twining in
shrubs, enlarged
calyx lobe ~~white~~ ^{white} <sub>outer lobes
of calyx</sub>
corolla bright yellow;
hair on petioles maroon.

cymule

shrub 2 m. tall; ripe
fruit yellow.

shrub 1 m. tall; buds
white, slightly purplish.
slender, sparsely branched shrub
1 m. tall; fruit crimson.

36940

3

*Joinvillea elegans*common in openings and
along trail

Fraser's Hill is a rather recent ~~so~~ resort settlement with many winding roads and bungalows, situated on the main crest of the mountains between Pahang and Selangor, at somewhat over 4000 feet.

There is much planting of ornamentals, pines, araucarias, Eucalyptus, etc. around the settlement.

Cleared areas, where not in lawn or garden, are occupied by a lush tangle of ferns - *Gleichenia*, *Athyrium*, etc., *Joinvillea*, a weed that looks like *Phragmites*, bushes, etc.

The ridge forest varies considerably in stature, in some exposed places as low as 10 m, mostly 20-30 m. The trees seem to be of all heights, with no distinct layering evident, except a ~~tree~~ shrub layer and a herb layer.

caespitose, canes up to 4 m. tall; ripe fruit deep orange red.

Light is cut off very effectively by the trees so that little if any direct sunlight hits the ground. Tree genera seen ~~as~~ and recognized on the ridges were *Weinmannia* (*blumei*?), *Podocarpus*, *Quercus*, *Castanopsis*, *Pithecellobium*, *Eugenia*, *Cyathea*, *Caryota*. In a group of especially tall trees on a low part of the ridge were *Bucklandia* (a is *Lyningtonia* correct name?), *Litsea*, *Cinnamomum* (*cinebum*?), and *Calophyllum*.

Epiphytes are abundant on the trees, as well as creepers, especially those that cling close to the bark. Of epiphytes bryophytes, orchids, ferns, incl. filmy ferns, lichens are most common, though *Ficus* and such, which eventually reach the ground, are common enough. *Drynaria* and *Asplenium nidus* are conspicuous. Large ant tubercles, probably from *Drynaria*, are

seen fallen on the ground.

The shrub layer is rather dense, 2-4 m. high and too thick to walk through without cutting. In it are many melastomes, a large *Athyrium*, many rattans, an abundant semi-climbing palm - *Areca* or *Pinanga*, and a small fan palm, as well as *Freyinetia*, *Pandanus* (rare), *Amomum* and other zingiberaceae, *Chloranthus*, *Glochidion*, *Mussaenda* (climbing), and several other small Rubiaceae.

There is a distinct herb layer of ferns, *Polypodium*, *Elatostemma*, *Geraniaceae* (incl. *Didymocarpus* spp.), and *Melastomes* (?), and abundant mosses, incl. a very large dark green one.

The soil has an accumulation of several inches of raw humus, overlying a fine gray-brown silty or clay soil. The weathering is apparently fairly deep.

In low gaps and in ravines the epiphytes are more luxuriant. The undergrowth, also is more abundant, and includes a greater abundance of small palms and zingiberaceae, as well as a slender *Musa*. Leaf epiphytes are conspicuous, as is *Asplenium nidus*.

On steep parts of the ridge an elongate climbing bamboo becomes very common. On level parts toward Pine Tree Hill the trees are tall, about 30-35 m. and the canopy is denser. The undergrowth is correspondingly sparser and more open.

On slopes (45°-75°) on sides of ridges the trees are tall, 30 m. or more, there is no sign of definite layering above the shrub layer, which is denser than on ridges. The canopy is rather uneven. Ferns and rattans are abundant in shrub layer. Epiphytes and herbs are abundant. Principal trees seen are *Quercus*, *Canarium*, *Eugenia*,

Xerospermum, Barringtonia,
Beilschmiedia, Phoebe,
Calophyllum, Litsea,
Parinari, Vatica, etc.

Several species of Sarauis,
Amonum, Cyathea, palms,
etc. in undergrowth.

Smilax and other
climbers abundant.

Mosses and filmy
ferns are conspicuous.

April 22 - Kepong Forest
Research Station

36941 *Melastoma malabathricum*
bushy roadside

1 42 verb.
common on bushy roadsides
and in young plantings of trees

1 43 *Cyperus*
occasional on grassy roadside

2 44 *Salaginella*
common in second growth

1 45 *Axonopus compressus*
very common in grassy
places and on trails.

1 46 *Upuna borneensis*
~~cultivated~~ planted in arboretum

1 47 *Shorea acuminata* Dyer
planted in arboretum

get alt. from
air chart

shrub 2 m. tall, flowers
rose pink, filaments
curved.

small tree 4 m. tall
flowers greenish and
violet, filaments
long, curved, white.
roots fragrant.

climbing

young tree 6-8 m. tall.

tall tree 25 m. tall,
fruits and leaves picked
up from ground beneath.
Gum exuded from scars
on trunk, hardened.

April 22 - Air trip from Kuala Lumpur to Singapore (straight from Kuala Lumpur to Malacca, then along coast) (from southwest side of plane).

The outwash from the tin mines is white sand, the actual mines are varicolored, from red to brown, yellow, white. There are many ponds, some of them very green. The white sand is in places largely revegetated.

In the tin area near Kuala Lumpur some of the hills are covered by lalang (*Imperata*), others by *Gleichenia*. The two are nearly the same green, but lalang is somewhat lighter, *Gleichenia* brighter.

South of Kuala Lumpur is mostly in rubber plantations. Much of this is in hedge style planting, either in straight rows or maze-like.

The country is hilly but mostly in rubber except a few lalang patches and a very little forest along several closely meandering rivers. The river into the

meanders are grassy, the part back of the grass is wooded, as well as the concave sides. Rubber on both sides.

Young rubber is generally deep green and with a closely tessellated pattern or texture. The older rubber is grayish green at this season and has a much less well defined texture.

Southeastward are some higher hills with forest (definitely darker green than rubber and mixed spotting of different greens) and patches of bright green lalang.

In valleys to southwest brownish rice land forms dendritic strips.

Some tin mining on rivers southeast of these hills. Rubber between these rivers. The rivers are a café-au-lait color.

As we get nearer the coast ~~at~~ the hills are lower and all in rubber but a few forests just inland from an odd-shaped finger-like cape. South of this is a conspicuous estuary

with a rather broad area of mangrove extending well inland. Here are some patches of forest, and some brushy fern land, much new rubber plantation contour terraced. There are less plantations than in most places, especially less mature ones. Some rice-land in dendritic strips - dirt color^{at} this season.

Southward are many newly terraced patches, bare and pinkish white.

Rice becomes dominant southward and nearer the coast, around Malacca; and south of it is a definite narrow band behind a narrow mangrove belt. A few tiny sandy beaches, either red or white, a bit south of Malacca.

One hour south of Kuala Lumpur - 3 large canals cut from inland to the sea - for drainage?

In the large bay north of the last headland before Johore Strait are curious cusps or points projecting out at right angles to the

mangrove shore. Points are apparently of mangroves. Thus:



How can ^{be explained} features like Johore Strait, of which there are several also on the northeast coast of Sumatra and the east coast of ~~Java~~ Borneo. They are narrow arcuate channels cutting bite-like islands out of the coast.

April 23 - Singapore Island
The Gap

A small hill, beside The Gap, may be considered typical of a considerable amount of land on the sedimentary hills of Singapore. It is of sandstone, with the soil completely eroded off of the upper parts, except for what is held in pockets, and that is filled with broken rock and bits of ironstone (indicating that the soil, before the erosion, was severely laterized?). Lower slopes with deeper soil, but very deeply gullied.

On the slopes the principal plants are: *Adenandra* sp.

Gleichenia linearis
(grass or sedge)

Gahnia sp.

Dillenia suffruticosa

Lycopodium cernuum

Ficus alba

Myrica sp.

Fagraea fragrans (small sapling)

Canaceae

Rhodamnia

Nepenthes sp.

Burmehdia? (Cactid)

Clerodendrum sp.

The vegetation is a very

low stature, to 2 m. tall, varying from sparse, bare ground, even, to closed and grassy or scrubby.

The top of the hill affords slightly more favorable conditions, with a small relatively flat area. Here are

Melastoma malabathricum
Ischaemum sp.

Imperata cylindrica

Blechnum orientale

Cordia cylindrostachya

Sporobolus (large, elongate-like)

Digitaria violacea

Chrysopogon aciculatus

Cyperus sp.

Borreria sp.

in addition to the plants found on the slopes. *Dillenia* and *Ficus* form low thickets, 2 m. or so high.

3 of each
OK

April 23 - The Gap

eroded land with sparse
grass and shrubs on sandstone.

36948

Melastoma malabathricum
~~shrub~~ at base of hill

49

grass?

very common even on most
eroded places

50

Clerodendrum
occasional

51

Ficus alba

occasional in scrubby spots.

52

Adenandra
common

Pandau

April 23 - ~~Cameron~~ (?) Reserve
Mangrove swamp

53

Avicennia officinalis

common in interior of swamp

54

Pavetta

rare in interior of swamp

54a

*Dischidia rafflesiana*rare epiphyte, on *Rumnitzera*

near inner margin of swamp

(1)

53a

Dalbergia candenensis Prain = *D. torta* Grah.
~~scandent~~ edge of mangrove swamp

April 23 - The Gap

52a

*Nepenthes*on badly eroded slopes of sandstone with
scattered shrubs and sparse grass

40-70 m.

shrub

tufted

shrub 1-1.5 m. tall.

shrub 2 m. tall, leaves
variable in outline.

shrub 1.5 m. tall.

0 m.

small tree, flowers yellow.

woody scramble; flowers
white.creeper, pitchers laterally
compressed, inhabited by
small ants.

det. H.M.

Burkill

scandent

65 m.

Pandan

April 23 - ~~Cannus~~ (?) Nature Reserve -

"wet mangrove swamp"

This is a rather extensive area of mangrove of rather low stature. The substratum is mud, which in even small openings, is built up into steep conical mounds with holes at the top, said to be built by fiddler crabs.

These would protrude above most high tides. And very few of them have any plants growing on them, occasionally a young *Acrostichum*.

The principal trees here are *Avicennia officinalis*, *Bruguiera* sp. (small fl. like *maldivica* sp.) *Rhizophora apiculata* (?), *R. mucronata*, with *Scyphiphora hydrophyllacea* and *Acrostichum* common enough. *Sumnitzera* and *Bruguiera* only seen toward inner margin of swamp, the *Bruguiera* very rare. *Dischidia rafflesiana* seen only on *Sumnitzera*.

Along road across swamp many more plants are to be seen. There are on ground covered by salt water at highest spring tides. Those seen were:

Hibiscus tiliaceus
Morinda citrifolia

Acanthus ilicifolius?

Randia sp.

Allophyllus sp.

Lygodium scandens (?)

Peristrepis sp.

Pavetta sp.

Glochidion (or *Officinalis*) sp.

Excoecaria agallocha

Dalbergia (virens)

Wedelia bilbo

Eleusine indica

Cyperus sp.

Isleria sp.

Melastoma malabathricum

Nephrolepis biserrata

Dillenia suffruticosa

Ipomoea pes-caprae - cf. *brasiliana*.

Flagellaria indica

From boat along north side of estuary the swamp is rather uniform, the trees back from the edge reaching to 10-12 m, much lower along edge. This stand is 20 or more years old. The plants seen are

a *Rhizophora apiculata*

o *R. mucronata*

c *Avicennia officinalis*

l *Sonneratia* sp. (only toward head of estuary)

o *Scyphiphora hydrophyllacea*

o *Bruguiera* (small fl.)

~ *Nypa fruticans*

The top of the canopy here is very uneven. The stilt roots of both species of ~~Rhizophora~~ *Rhizophora* generally originate 1.5 m. or less ~~from~~ above base of tree, but occasionally 2 m. or higher, even coming down from branches. The roots may arch secondarily twice or more times, branching each time.

On the south side of the estuary the stand is of more even height, though varying from place to place from 3 to 3 m. Some doubt if this was cut during war, but may have been, at least in places.

On this side *Scyphiphora* is more common. There is also more ~~so~~ bare soil exposed at low & mid tide. *Rhizophora mucronata* is more common here, but occurs as single trees. The leaves of this are broadly elliptic, broadly acute, almost obtuse, the cymes 4-flowered, drooping. The radicle up to 0.5 m. long. The roots on this rarely originate from as high as 2 m.

The other species, commonly called *R. conjugata* (but incorrectly acc. Merrill) has narrower and smaller leaves, very slightly acuminate (looks a little like *Bruguiera conjugata*). Its inflorescences are here uniformly 2-flowered, stiffly divaricate from stem, very short. The radicle (scarcely any seen at this season) only 10-20 cm. long.

Inland from swamp are ponds for culture of prawns. The mounds built by fiddler crabs are conspicuous in these.

April 23. Water catchment area -

Mostly "belukar" or secondary growth, in fairly advanced condition. A thick stand of ~~poles~~ pole-sized trees, about 15 m. tall, to 10 cm. dbh., including *Ficus* spp., *Hydnocarpus*, *Oxymitra*, etc. Undergrowth rather thin locally, with a few rattans. Borders are lined with ~~at~~ luxuriant *Gleichenia linearis*.

Several small areas of swamp forest.

In one the peat is over 1 m. deep in center - is really a much rather than peat. At this season ^{mostly} firm enough to walk on, usually has standing water.

General height of trees about 20 m., a few large emergents. Trees mostly small, canopy uneven. Palms, *Galaka* and *Oncosperma*, common. Little undergrowth, some *Hornalomena* on ground but sparse and irregular.

Another larger patch has trees irregular in size, but a full canopy at about 20 m., some trees to 30 m. or more.

There is rather thick undergrowth up to 4-5 m. tall, with many rattans and some *Freyinetia*, many shrubs and vines. Very tangled under ~~some~~ both thin and dense places in canopy. Trees generally buttressed. Stilt roots common, even on shrubs. Some *Galaka* and *Oncosperma*.

Ferns common, both on ground and epiphytic. Many epiphyllous bryophytes. Ground a deep soft muck, with a little standing water in place. *Cryptocoryne* common in spots where undergrowth not too dense.

April 24 - Flight Singapore to Bangkok.

Areas of low mangrove around east end of Strait of Johore with winding tidal streams around inlets, suggesting a drowned coastline. All higher ground seems to be in rubber plantations except a cluster of low hills which has grassy ridges and thickets in the ravines.

North of this, a short distance the country is low hilly and solidly forested. These hills have large emergent trees, the low places between them have a very smooth canopy, possibly swamp.

Northward mostly cloudy. As coast is approached the country is forested but with many patches of belukar.

Just back of the coast the streams meander intricately in what must be swamp forest. They are not at all muddy but very dark. Coast has sandy beach, the sea is blue, not at all muddy.

There are many small clearings immediately along beaches. Crossing the bulge of the east coast streams trend east through low forested country, meandering with many oxbows. They are very muddy. Along the streams are many clearings and patches of belukar. The hilly country to the north is densely wooded, with a few clearings at first, then as it gets rougher, none at all, but dense virgin forest, with emergent trees clearly visible from 16,500'. Then, low hilly country with muddy streams trending eastward. Many clearings along larger streams. Landslide scars clearly seen. Abundant cumulus clouds. Large river leaving hills, enters lowland and starts to meander. Along meandering part is extensive clearing, running up to foothills even far away from river. A little shifting cultivation along river in hills. The lowland here is very largely cleared, or in belukar or rubber. It is hard to distinguish

the rubber with certainty from 16500'. Considerable patchwork in lowland and on low hills, shifting cultivation on somewhat higher hills.

As coast is approached again, mostly forest, little clearing except on immediate coast near ^{and back from it northward} Trengganu. North of Trengganu is an extensive system of old beaches and dune lines, ponds back of present beach, and a meandering river trending along the coast back of the dunes in a swampy forest. Long lines of sand with sparse scrub and thin lines of woods or brush. (This is opposite ~~to~~ Pulau Redang and the islets northwest of it.)

April 24 - Approaching Thailand from south - islands and headlands on east side of Gulf of Siam - much cleared land in lowlands, hills largely wooded, but poor looking woods. Rock showing through on islands. Bays to east are lined by reddish beaches. Some red erosion scars on land in lowlands. Islands are high, not especially rough, shores

of reddish rock with white beaches. Islands are not so scarcely cultivated, at least on west sides. Smallest of them are completely denuded, almost so.

Sea at head of gulf very muddy, much very low mangrove along coast, cut into by rectangular patches [salt farms]. Then a strip of solid cultivation - open fields. Then a strip, that appears to be mangrove, also along big river estuaries, but this is really thickly settled land with miscellaneous cultivation - coconuts, bananas, etc. Many trees. Strips of houses with abundant trees along watercourses, many small isolated patches, too. All else rice fields - brown now.

Driving to Bangkok from airport - rice fields, home sites surrounded by bamboo clumps and trees. Along road are canals filled with *Eichhornia*, *Pistia*, *Polygonum*, and other water plants.

Bangkok a very open city, with considerable ground in gardens and trees, only locally congested.

April 27 - Wang Noi

Market - fruits & vegetables for sale:

mangoes

pineapples

~~Passiflora~~ ^{an} ~~Baccharis~~ sapida

Sandozium indicum

bananas

Curcuma sessilis & parviflora

Neptunia oleracea

Coccinea indica

Sporobolus pinnatus

Acacia ~~indica~~ ^{insignis}

Cucurbita moschata

jack fruit

This whole area, from Bangkok to the Rapipat Canal is perfectly flat low-lying rice land, flooded every year. Houses and villages are like islands, marked by abundant clumps of bamboo, and by trees - mango, Elaeocarpus and Combretum quadrangulare.

The fields are separated by low dykes. Have been lying fallow, as just being plowed. Soil dark, brownish gray. The dark layer is, in places, only a few inches deep, over a tan colored subsoil. In other spots it is considerably deeper.

^{North} East of the Rapipat Canal, ^{about Saraburi} the land changes abruptly. It is slightly higher and not flooded, though equally flat. The soil is very pale - the surface cream color, somewhat darker café au lait below. It is watered only by rain. The fields are separated by high well kept dykes of mud. Much more labor is involved in producing rice here. The soil is more sterile. Scattered abundantly over the landscape are trees, or tiny clumps of trees, or bamboo, said to be left for shade ~~also~~ for workers in the fields. The base of each clump has a mound of soil up to 1.5 m. high, light gray-brown, built up by termites. Several species of trees are found here, and a number of herbs and shrubs. These mounds are scattered over the landscape, spaced from 50 m. to 200 m. apart, giving the entire landscape, from the canal to the foot of the hills near Pukae Garden, a strange character. More frequent toward foot of hills.

April 27 - Pukae Botanical Garden

a black silt soil, comparable to the black cotton soils of India. When moist is very plastic and stiff. According to test of colloid content by ^{Wilke} Cenco testing but has a colloid value of 10 - called a loamy sand. However, texturally it would be certainly a silty clay or silt. There is no sand, whatever, but the colloid content is exceedingly low.

The natural forest on this soil was dry evergreen forest, with *Dipterocarpus alatus*, *Eretia*, *Anogeissus acuminata*, *Trewia nudiflora*. ~~It is also~~ *Homalium*, *Alangium*, *Bischofia javanica*.

None of this forest left here now. It is an alluvial plain at the foot of limestone mountains. Much of the garden is in low secondary thicket with scattered trees, much of this has been cleared except the trees, which are perhaps 10-30 m. apart, some large near the river (a canal), lower farther away.

North ~~East~~ of Pukae and extending south^{east}ward is a range of high limestone hills and buttes. They are of a bluish massive limestone. Their sides tend to be steep to vertical with talus slopes at base. This limestone possibly is the parent material of the black soils to the west, even though there overlie sandstone. They seem to be on silt plains, the silt of which may, at least in part, come from here.

The slopes of these hills are thinly wooded, except on vertical faces, which are mostly bare, especially on the west and southwest sides. This wood is burned over annually, for no apparent reason except carelessness and using fire to scare out deer. The result is that the vegetation is less well developed than it would otherwise be.

The branch road to Ayutthaya runs through vast rice fields, in places thickly strewn with houses, in others without a house or even a bush for miles. The houses, as usual, are surrounded by ~~clumps~~ clumps of bamboo or by a veritable thicket hedge of it. The hedge bamboo is said to be spiny.

As the river is approached near Ayutthaya, thickets become numerous and extensive alternating with rice fields and houses. Ruins of masonry structures become more and more frequent, half covered by thicket. The old capital, at Ayutthaya, was destroyed by the Burmese about 200 years ago. There is still much settlement here, especially along the river, but not much city is yet evident.

April 27 - Pukea Botanical Garden

36995a *Dipterocarpus*

Apr. 29 - Bang Chai Jark, just
southeast of Bangkok,

Along tidal channels
between rice fields and road.

36955 *Sonneratia acida*
common

3 55b *Emilia sonchifolia*
local on railroad embankment

with *Acanthus ebracteatus*,
etc.

tree 10 m. tall, flowers
with narrow deep
purple petals, white stamens,
flowers light purple

Along road east are flats covered by a grass, possibly *Paspalum vaginatum* with *Pluchea indica*, *Acrostichum*, etc. Farther on replaced by *Suaeda maritima* and *Sesuvium* with *Paspalum*.

Further east are *Avicennia* flats, a pure stand, but kept very low, 1-3 m., by continued cutting, even of small sticks for firewood.

This road runs eastward parallel to the coast. eastward the mangrove becomes more diversified, with patches and single plants of *Rhizophora* and other mangrove species, areas of *Nypa* and of *Acrostichum*. The general background is usually *Avicennia*, perhaps 2 species. The *Rhizophora* appears to be *R. apiculata* or something similar, some *R. mucronata* locally. The trees seem not to reach more than 5-7 m. Probably they are always cut before they get any larger.

Nearer the Bang Pa Kong River some *Excoecaria* is to be seen, but *Avicennia* is found also in pure stands again. For one km. or so on each side of the river the vegetation ^{in patches} seems to be dominantly a low tangle of *Sonneratia* ^{with} *trifolia* and some *Acrostichum*. ~~and~~ considerable mangrove ^{and large areas of} *Nypa* ^{stands}. Southward toward Choburi there is some slightly higher ground, with mixed cultivation, alternating with mangrove swamps.

All the way east from somewhat south of Bangkok the road seems to be a sort of boundary between the saline tidal influence and fresh water rice fields. A large canal runs landward of the road - excavated to provide the earth for the road fill.

Between Samut Prakan and Bang Pa Kong, on the seaward side of the road are extensive "salt farms" - evaporations

beds cleared from the mangrove. These are only used during the dry season.

Toward Bang Pa Kong there are, again, some *Suaeda* flats on both sides of the road. The *Suaeda* varies, from plant to plant, from a bluish or grayish green to a reddish purple.

There are also flats of *Lescurium* and of *Paspalum*. The *Lescurium* is somewhat different from that in the Pacific. Leaves are dull and flattened, stems not conspicuously red, flower pink. Mainly miscellaneous cultivation.

The area from Choburi to Bangsaen is varied, from low marshy or swampy areas to dry land and even a few small hills. Coconuts are planted generally on higher ground and attempts are being made to plant them on ridges piled up in the swamps and marshes. *Tapioca* is generally grown on

ground slightly higher than the marsh, rice in marshy land that is not too salty. Coconuts and *Borassus* abundant.

Near Banglaen is a small area that is in rice and other cultivation, but has scattered clumps of shrubs or trees ^{a bamboo} with huge mounds of earth, probably termite mounds, many *Borassus*, in rows and clumps.

At Banglaen is a sandy flat, quite broad, with many weeds, especially *Tridax procumbens* and several winged sedges. Here are *Ipomoea pes-caprae*, *Vitex ovata*, *Vigna* (?) sp., *Tribulus cistoides*.

In low spots *Saccharum spontaneum*, a very slender variety.

An isolated hill of quartzite has on its seaward side thickets predominately of a spiny bamboo. On the other side a dense tangle of shrubs, small trees, and vines. On ridge a scrubby forest, esp. *Ficus* aff. ~~para~~ *religiosa*.

Some
Borassus

April 29-30, Bang Saen
sand flat back of
beach

- 2 36956 *Sporobolus per-caprae*
common
- 1 57 *Boerhavia*
very common
- 2 58 *Saccharum spontaneum* L.
very local
- 1 59 *Boerhavia diffusa*
uncommon
- 2 ~~60~~ ~~*Ficus aff. religiosa*~~
~~common~~
- 3 60 *Vitex*
common
- 2 61 *Euphorbia*
occasional

April 29 Bang Saen, ^{Chao} Kkoo Lommuk
hill of quartzite

- 3 62 *Boerhavia*
abundant along road and on talus
- 2 63 *Ficus aff. religiosa*
common on

1 m.

prostrate, flowers bright
purple.
leafy stem prostrate, inflorescence
ascending; flowers red.
forming dense brake 2 m. tall

prostrate, flowers pink.

prostrate with erect
flowering stems, extensive;
flowers violet outside, paler
within.

stems ascending, somewhat
arched, ~~prostrate~~

10 m.

prostrate, inflorescence
ascending; leaves white beneath.
small tree, roots running
down over rocks; ripe fruit purple.

April 30 Bang Phra

handy flat back of
beach, with small
ponds and mangrove
swamps.

36964 *Ceriops*

1 very common in small
mangrove swamps.

1 65 *Barreria*

occasional on sand

1 66 *Avicennia*

common in small mangrove swamps

2 67 *Ipomoea pes-caprae*

common on sand flat

2 68 *Fimbristylis*

common on sand flat

bush 1 m. tall.

prostrate; ~~flowers~~ ^{corolla} white.
tube slender.

shrub 1 m. tall; flowers
orange.

prostrate, extensive;
seeds on ground.

Caespitose, leaves stiff.

April 30 - south from
Bang Phra to Si Racha
vegetation gets more
luxuriant. Small
hills are wooded
but ~~the~~ woods seem
very degraded and
showing evidence
of shifting cultivation
on slopes. In flat land
~~between~~ back of
~~the~~ beach Manihot
is extensively cultivated.
Jack fruit trees common.

South of Si Racha
wooded hills, flat
land between them with
much mango, Thyrsostachys,
jack, banana, tapioca.
Shifting cultivation
"lun loi" and tangled
second growth on hills.
Second growth called
"~~ph~~arang" "pah rang".
~~Primary forest~~

From 6 (-10) km. north of
~~the~~ Bang Lamung are
scattered large Dipterocarpus
trees on rolling land just
back of coast and at a few
m. elevation. These left
from clearing of forest.

Miscellaneous cultivation
and large patches of
low secondary scrub.
various ages. Coconuts,
tapioca, rice, bananas,
jack, papaya, mangoes, papaya.
South of Bang Lamung
dipterocarps ~~disappear~~ ^{become scarce} and local.
Coconuts most common.
A very few Brassicas.

Common roadside weeds
are Imperata, Eupatorium
odoratum, Tripsacis, Boerhaavia.
locally ~~gossypifolia~~ Jatropha
gossypifolia.

Patya Bay

Low bluffs of ^{porous} ironstone
overlying a coarse granite.
Thickets of Xylocarpus,
Clerodendrum inerme,
Wedelia biflora, several
shrubs.
Beach of light gray
sand.

April 30 - Bangkok is characterized by ~~the~~ an abundance of canals, now mostly in disuse. These have a profusion of water plants, which are gathered and utilized to some extent for pig and chicken-feed. The following were noticed, but the list is by no means exhaustive:

Eichhornia crassipes
Marsilea sp.
Polygonum tomentosum
Nymphaea lotus
Nelumbo nucifera
Lemna sp.
Pistia stratiotes
Azolla sp.
Cyperus sp.
Commelina diffusa
Alternanthera repens
Victoria regia

Bangkok is not especially noted for its cultivated plants. Many of the common tropical ones are present, but one is not especially impressed by them. These ~~are~~ are prominent:

Delonix regia
Mangifera indica
Musa spp.
Cocos nucifera
Casuarina equisetifolia
Lamanea saman
Hibiscus hybrids
Elaeocarpus sp.
Polyscias spp.

May 1 - flight from Bangkok to Hong Kong
Rice fields east of Bangkok have mostly been plowed. Many small ponds scattered here and there, some obviously very temporary pools, some more established. Near Bangkok there are scattered dwellings surrounded by bamboos, *Elaeocarpus*, and other trees.

Further east there is a major pattern of canals running north and south at regular intervals, intersecting with one large one along exact course of plane. Fields are oriented perpendicular to these canals and all dwellings concentrated along canals. Most fields have been plowed, some are very wet.

Somewhat more to the east the canals become much less regular and seem, judging from oxbows, etc., to follow meanders of former streams to some extent. Here are a great many more ponds and in the

general network of channels in the bottom-lands of the Bang Pa Kong river the regular rectangular pattern of the rice fields disappears. But it is still all rice cultivation.

Eastward of the river there seems to be no regular pattern. There are some long canals and a number of meandering water-courses, but the rice patches are not oriented in any regular manner. Villages are marked as patches of trees. Locally the rice seems submerged.

After some cloudiness the country is mountainous and forested, rather few clearings. Visibility poor. Then the course crosses a major escarpment, or rather follows just south of it, with a valley to the north with considerable clearing. Then the land becomes rather level, but almost entirely forested - a dense canopy characterized by abundant emergent trees. A single

winding red road connecting scattered clearings. Then some gently hilly land, hills apparently rather high, densely forested, abundant emergent trees.

Then ~~a north~~ eastward trending valley with considerable cleared land and a very different sort of forest, some apparently rather dry grassland along river (probably fallow rice land).

South of it a very level terrace, mostly forested with the same very even type of forest as in the upper part of the valley bottom, ~~a~~ completely without emergent trees. Then more meandering tributaries with broad belts of rice fields, now brown.

Then a large wooded plain, with, at first, some clearings and secondary forest, then solid forest, locally quite even textured, locally with emergents. Then rather large cleared areas. Soil very red. Cleared areas irregular in outline but

tending to follow drainage pattern to northward, evidently occupying the lowest parts of these very flat valleys.

Then cloudiness becomes almost complete.

Glimpses of land through clouds, ~~west of the valley and north of the river~~ show forest with numerous clearings.

Visibility again good west of Lisaket in Nam Mun valley. Mostly cleared and intensively planted to rice.

Nam Si River, entering Nam Mun above Ubon, shows amazing series of meanders and oxbows, some dry, some with water. Conspicuous reddish tan sand bars being built on convex sides of meanders. Country here, and

especially just east of Ubon, is a curious pattern of ^{large patches of} green, apparently bush fallow, with ^{patches of} brown rice fields. These with sparsely scattered trees. The green very much cut up into small patches, some cleared and

burned, some actually tree covered. An air strip trending n.e.s.w. has evidently been rendered unfit for use by cross barriers and excavations.

Eastward the texture of this pattern becomes finer, the patches smaller, with less rice in proportion to shifting cultivation, then rice again predominates. At least there are small patches oriented like rice patches - no evidence of irrigation system from this altitude (15,000').

Scattered trees become more and more abundant, watercourses accompanied by strips of woods.

Then a patch of wooded country, possibly slightly hilly, clearly secondary woods.

Visibility becomes poor again. Crossed Mekong but could not see it.

10 minutes west of Tourane. Mountainous country, with rivers entrenched in V shaped valleys, trending north. Ridges wooded, but with slopes cleared irregularly, mostly in scrubby second growth. Some patches of good forest on high slopes. Streams not muddy. A fairly large river running easterly, becomes muddy lower down, though forest becomes better, less cleared eastward. Much less shifting cultivation and mostly continuous forest 5 minutes west of Tourane. Visibility poor. Some rice land in flat valley bottom. Poor second growth on slopes and ridges above this.

at sea between Tourane and North Reef, about 15²⁰ minutes out. Curious tan colored patches on sea, diffused in an elongate manner parallel with wind waves and forming long irregular streaks, as though either a finely miscible silt or a surface foam were drifting along, rather irregularly arranged by wind. This appearance extends for miles to the northward in irregular bands, some bands east and west, also, but these cross banded ~~for a short distance~~ diagonal to principal swell pattern. At first sight appeared to be reflections of sun through holes in clouds, broken up by waves, but this incorrect, because the pattern is same viewed from any angle. No obvious explanation. Three principal areas affected, within about 6 minutes flying time. Another shortly after.

Water generally blue, but not brightest blue, because of thin overcast. More in long

thin bands or streamers a little farther on.

Could be a plankton bloom. Patches become much more abundant and denser about 6 minutes farther east, as though someone had spilled gigantic sacks of bran on the surface of the sea which had then been irregularly carried down-wind, almost like innumerable tiny smoke bombs.

Judging by color of water, the depth here is not great. A mottled rather light blue, with some patches quite light.

Surface phenomenon now very common, extending in streaks miles long, irregularly cross banded, more diffuse eastward, but if anything more abundant. Visible far to southward, too, as well as to north. Is undoubtedly something on surface, like foam. More and more abundant eastward. Then extremely abundant northward but no more to east as North Reef is approached.

North Reef is a perfect drowned atoll, with breakers all around except on west end. Lagoon in west end, about $\frac{2}{3}$ as long as entire reef. Reef very broad, especially on east end. Only one very narrow channel, on s.w. corner, this not clear on inner end. Whole reef light green with brown patches and fine mottling. Lagoon with network of small reefs. No dry land at all.

A very few stringers of discoloration on sea surface east of reef, much visible to north, along course which is now northward.

After a few minutes no more discoloration seen.

a long island or two islands across mouth of harbor to east. These have little or no woody vegetation.

Approaching Hong Kong - many small rocky islands of all sizes. Smallest outer ones with no vegetation or only grass. Larger ones with grass and small thickets. Conspicuous reddish intertidal zone, occasionally a very narrow reddish beach. On most islets, little woody vegetation, much exposed rock. Mostly not inhabited, but a small city on one in entrance to bay. Coastline very intricate scarcely possible to distinguish larger mountainous islands from mainland. Mainland hills grassy, small patches of woods near tops, but very few. Many ridges bare and eroded, red.

Hong Kong Island more wooded. Hills back of Kowloon exceedingly eroded and bare.

Hong Kong Island mainly grassy, but with low brush or bushy woods on steepest slopes and in ravines. A little terracing on slopes, but not much. Entire area very rugged.

May 15 - area between Naha and Kadena Air Base -

A disturbance complex on deeply weathered reddish soil derived from limestone, with limestone knobs, chimneys, and pinnacles cropping out here and there.

The vegetation is a mixture of patches of *Miscanthus*, *Imperata*, low mixed thicket, scattered trees and clumps of *Pinus luchuensis*, ferns, and *Cycas revoluta*. Exposures of limestone generally fern-covered.

Animals -

Lot 3. May 15,
land shell

Yaka, n.e. of Ishikawa
scrub-covered hills,
reddish soil

May 15 - Yaka, n.e. of
Ishikawa

The hills here are covered with a degraded scrub mixed with *Miscanthus sinensis* on a sterile reddish soil with angular rock fragments.

Aristida, *Dianella*, *Aletris*, *Spiranthes*, *Drosera*, and *Lindsaya*, *Gleichenia* are common herbs, *Schinus*, *Lymflocos*, *Vaccinium*, *Rhodomyrtus*, etc. are common shrubs, with young *Pinus luchuensis* coming up everywhere in great abundance, to 2 or 3 m. tall. This area has been forest mostly pine, till after the war. Then it was logged off completely.

At the top of the beach is a row of *Pandanus* - probably the *P. tectorius* var. *liukienensis* of the Walker's flora. It is certainly much like the slender plant of Ceylon, India, etc. in habit. *Cycas* absent from this area.

May 15 - Area between Kin-son and Kochiya is limestone and generally cultivated. *Cycas agilis* noticed on scarps and outcrops.

Road across the island between Kochiya and Kobesoko - this area has also been cut over clean. It is ^{covered by} a scrub mixed with *Miscanthus* and, at higher altitudes, with *Pleioblastus linearis*. The higher part of this road is called Meiji-yama. It is said that during the period of the Meiji emperor when much money was available for forestry, much camphor was planted here. The scrub is about 2 m. high. *Rhus*, *Aralia*, *Raphiolepis*, etc. Small pines are scattered all through this.

Animals -

Lot 4 May 15

Burma, s. shore of Motabu Peninsula
land shells in sand at top of beach, sub-fossil.

May 15 - Burma, on south shore of Motabu Peninsula that beach of pale fine sand (sampled). At top of beach, thickets of *Scaevola*, both glabrous and densely pubescent forms growing side by side. On the sand are mats of *Vigna* - a smaller leaved plant than *V. marina*, much more compact, flowers perhaps larger. *Sporoxys per-caprae* v. *brasilensis*, *Exeris repens*, *Pippia nodiflora*, *Thunarea*, etc. creeping on sand. *Chenopodium acuminatum*, erect, scattered among the prostrate plants.

Among the *Scaevola* is also *Clerodendrum inerme* and *Pandanus*.

The bluffs and foothills above the beach are of limestone. They are covered by a low scrub of *Pandanus*, *Cycas*, *Ficus* (*F. gibbosa*, *F. retusa*, *F. wrightiana*), *Psidium guajava*, *Berchemia lineata*, a dwarf bamboo, etc. mixed with *Miscanthus* and small pines.

May 15 - Yaka, n.e. of
Ishikawa, Kunigami-gun
seashore

- 36969 *Hedyotis* (*decussifolia*)
on hard gray shale (or schist)
just above high tide level
- 4 70 *Euphorbia chamissonis* Boiss.?
on sand at top of beach
chamaesyce *etolo* (6 Foot) *fragil*
- 71 *Vitex* *trifolia* var. *simplicifolia* *clan*
rotundifolia
on sand near top of beach
- 2 72 *Thuarea involuta* (Forst.) R. & S.
on sandy beach
- 4 73 *Schinus leucocarpus* Nakai
sterile bushy hills
overlooking beach, common.
- 1 74 *Selaginella* *lutea* *lutea* *Kridg.*
shaded side of small
ravine on sterile bushy
hill overlooking beach
- 3 75 *Vaccinium* *wrightii* A. Gray
common on sterile bushy
hills overlooking beach
- 1 76 *Spiranthes* *chamaejasme*
rare on sterile bushy
hill overlooking beach
S. sinensis *Ames*
- 1 77 *Lindsaea* *orbiculata* (Lam.) Mett.
rare on sterile bushy
hill overlooking beach
Lindsaea

1 m.



prostrate, leaves fleshy;
flowers white, throat
closed by stiff hairs.

almost prostrate
lactiferous; leaves
pale beneath, sub-fleshy;
glands of involucre
greenish, pale.

prostrate, flowering
branches ascending,
flowers light violet
or bluish lavender.

10. *clan*

prostrate, rooting
at nodes, flowering
culms erect.

5-15 m.



large shrub; flowers
white.

prostrate, adhering to
earth, very fragile.

small shrub, fruit
dark red, immature,
said to be edible.
roots fleshy.

ok

- 36978 *Rhodomyrtus tomentosa* (Ait.) Hass.
1 common on sterile hills overlooking beach
- 2 79 *Psychotria serpens* L.
occasional on sterile hill overlooking beach

May 15 - Meiji-yama, ridge in center of island s.e. of Kobesoku;

- 2 80 *Gleichenia linearis* var. *ferruginea* (Bl.) v. A. v. R.
abundant in low scrub with dwarf bamboo.

May 15 - Buma, on south shore of Motoba Peninsula west of Awa;

- 2 81 *Sagittaria serpyllifolia* L.
on sloping limestone rock
- 2 82 *Ficus gibbosa* F. *virgata* Benth.
on sloping limestone rock
- 3 83 *Scaevola sericea* Vahl
on low bluff at top of beach (with 36984)
- 3 84 *Scaevola sericea* Vahl
on low bluff at top of beach (with 36983)
- 3 85 *Wedelia biflora* (L.) DC.
on low bluff at top of beach

shrub 0.5 m. tall, flowers rose-colored.

prostrate, branches ascending at tips, flowers greenish white.

Kunigami-gum

forming tangles.
Dicranopteris linearis (Burm. f.) Underw.

Kunigami-gum

5 m

6 m.

3 m. OK

2 m. OK

2 m. OK

shrub; veins white; fruit orange red, not mature; said to be edible.
hairy form - shrub 2 m. tall; flowers purplish.

glabrous form - shrub 2 m. tall, flowers purplish.

trailing herb, hanging down; flowers yellow.

36986

Calystegia soldanella (L.) R. & S.
Convolvulus soldanella L.

2

growing in sand
on upper part of beach

2 87

Chenopodium acuminatum
common at top of sandy beach

4 88

Vigna "indica"
common at top of sandy
beachMay 15 - Shio Gawa (Luga)
on south west side of
Motobu Peninsula, south
of Sakimoto; Kunigami-gun
3 89 *Ruppia maritima* L. (flower)
abundant in brackish
stream near mouthMay 15 - Shushi, on
north side of Motobu Peninsula
Nakajin Protected Forest
Nakajin-cho; Kunigami-gun
Broad leaved evergreen
forest

2 90

Lygodium microstachyum Desv.
common around edges of

1 91

Acer oblongatum
common in *A. ilicifolium* L.

4 92

Phyllanthus rhamnoides
common in edges of
Breynia officinalis Hemsl.rhizome white, deeply
buried in sand,
flower pale lavender pink,
open in afternoon;
stigmas 2, elongate.
erectprostrate, forming
mats 1 m. or so across;
flowers yellow,
keel ~~strong~~ not
twisted.This is a brackish water, actively
flowing stream, lined with
Hibiscus tiliaceus, *Clodendrum*
inense, *Murraya paniculata*, *Arundo donax*.
caespitose, weak,
trailing with current.

det. C. den Hartog 1969

fronds twining, tangled,
terminal part fertile.
young tree, sterile;
leaves glaucous beneath.
shrub 2 m. tall, flowers
yellowish, fruit erect,
reddish.

36993

Lasiacanthus nigrocapus Masam.*Thaplietidia nigrocapa*

common in shrub layer of

94

Randia canthioides

occasional in shrub layer of

95

Psychotria linkeana Hassk.

occasional in shrub layer of

96

Carex alluiformis C. B. Cl.

May 15 - Kami-motoque,
end of Motobokeninsula.
Limestone bluffs here
are covered with an almost
pure stand of *Cyacas revoluta*.

May 15 - Nakajin
Protected Forest, Shushi,
Nakajin-cho.

A former shrine forest
now preserved as a
natural vegetation reserve.

This is a low thick
forest up to 10-15 m. tall,
part of it in a ~~deep~~
ravine, the trees crooked
and gnarled, with a
complete canopy, and
a fairly thick shrub
layer. The walls of
the ravine are of rough
limestone.

weak shrub 2 m. tall;
flowers white, hairy.

shrub 2 m. tall,

flowers white; stigma
strongly exserted, narrow-
ly fusiform.

shrub 2 m. tall;

flowers greenish.

The tree layer has
Ficus, *Fraxinus*, *Lapindus*,
Diospyros, *Nauclea*,
etc. The shrub layer
has various *Rubiaceae*,
Arenca, *Elaeagnus*,
Acer, *Calophyllum*, etc.
Herb layer of ferns.
Breynia rhamnoides
around edges.

Arenca here is
definitely caulescent. The
trunk of one examined
was about 1.5 m. high,
the top part covered by
leaf bases, the bare
part perhaps 6 cm. thick.
Most of the plants have
much shorter trunks,
completely covered by leaf bases.
Pinnae scarcely or not auriculate,
fiber soft, cloth-like.

May 15 - Mts. south of Nakasoni

The higher parts of these hills, above the limestone, are covered with a vegetation predominantly of *Gleichenia linearis*, a thick blanket of it, with scattered *Lichina* and *Pinus* (small).

May 15 - beginning about 1 mi. south of Nago there is a broad reef flat cut into a coastline of shale and limestone. At the shoreward side of this are frequent stretches of beach-rock. These occur south to at least even with Kadena.

May 16 - fourth of Shuri and east of Naha the hills are covered by an almost pure stand of *Miscanthus*. Before the war this was pine forest.

No cycads seen in this area.

May 16 - south point of island, south of Kigan.

This is an area of "natural" grassland lying on a small rather rough plateau ^{or ramp} of limestone with pockets and small patches of chocolate-brown soil. Where the soil is thick there are patches of sweet potatoes, sugar cane, and other garden crops. Other parts, forming rather a "matrix" are ~~a~~ grass-covered, with principally *Miscanthus*, probably *M. sinensis*, but with some *Imperata*. On actual outcroppings of rough limestone the *Miscanthus* is mixed with scrub.

This scrub is composed of *Pandanus* sp., *Toddalia asiatica*, *Wikstroemia*, *Cycas*, *Ficus*, "Breynia", *Alpinia speciosa*, *Berchemia*, *Maytenus* (?), tangled with *Canavalia* and *Rhynchosia* with some *Dianella* and much *Ligularia*.

Viburnum
Pittosporum

Near the edge of the cliff in the vicinity of the beacon *Cycas* is very abundant, only occasional farther inland.

The *Pandanus* here is small and rather scrubby, slender, and shows two principal types, both somewhat variable. One has the leaf spines rather long and strongly divergent (though on the same leaf this may vary a great deal) and widely spaced, and has the phalanges somewhat flat topped, the carpels scarcely separated at the top. The other form has the spines smaller,

more appressed, and the carpels separated more or less conspicuously at the top. The fruiting heads of both types are about 15 cm. or less in diameter and spherical. The long-spined type is very much like the one in Ceylon, India, Maldives, etc. The other seems to be a form of *P. tectorius*. The two grow together and are not well separated.

The *Miscanthus* on Okinawa is quite variable, but certainly does not seem to be sharply separable into two species. One sort is broad-leaved and robust, the peduncles stout and tall. The other extreme has narrow flexible leaves, more slender culms and peduncles. However, there is no apparent sharp difference or boundary between them, either morphologically or geographically or ecologically.

May 16 - hills south of Ozato, south end of island.

On the broad limestone ridge south of Ozato is a large area of luxuriant *Miscanthus* with isolated shrubs and patches of scrub on limestone outcrops. The soil is a chocolate brown in color. Where it is thick are small patches of cultivation. Small holes have been dug scattered over the area, said to be from attempts to find old shells for scrap metal.

The scrub on the rough limestone is composed of *Viburnum*, *Cinnamomum*, *Macaranga*, *Mallotus*, *Toddalia*, *Pittosporum*, *Cycas*, *Dianella*, *Pandanus*, etc. liberally mixed with *Miscanthus*.

This area is fairly extensive. It does not seem to have been burned for several years, as there are scattered small pines.

May 16 - Southern Okinawa.

The whole area is a complex of patches of cultivation interspersed with grass and scrub. The principal cultivated crops are sweet potatoes, soy beans, sugar cane, a little rice in low places, a little maize, a few cabbages, etc.

The grass is on thin soil, slopes that are relatively steep, and on areas that are out of cultivation for military reasons. Scrub is generally on limestone outcrops. Cycads are fairly general on limestone but rare in center of island, commoner toward coast, abundant on actual coastal cliffs and bluffs. Pines become rare southward but are generally present except where there have been recent fires. They are absent in area just south of Shuri. Casuarina occasional southward, small.

May 18 - Kadena Air Base
housing area.

Small hills of limestone
here with pine forest
on them - the pines 10-20 cm.
diam. and 5-8 m. tall,
rather flat-topped.

No underbrush but a
complete ground cover of
vines.

May 16 - hills south of
Ozato; Shimajiri - gum
on rough limestone
outcrop in Miscanthus
grassland.

36997 *Nephrolepis cordifolia* (L.) Presl
common in scrub

1 98 *Carmona retusa* (Vahl) Masam.
rare in scrub *Ehretia microphylla* Lam.

5 99 *Mallotus japonicus* M.-A.
occasional in scrub

37000 *Croton cumingii* M.-A.
occasional in scrub

1 01 *Ficus erecta* var. *beckhamiana* (H. & A.) King
rare in scrub

02 *Cinnamomum japonicum* Sieber. ex Nees
occasional in scrub

4 03 *Pittosporum tolinia* (Willd.) Ait.
occasional in scrub

3 04 *Viburnum suspensum* Lindl.
common

fronds erect

flower white

shrub 2 m. tall

~~shrub~~ low shrub

shrub 0.5 m. tall,
fruit green with red
rifice.

shrub 2 m. tall, somewhat
aromatic.

shrub 1 m. tall,
fruit smooth, immature.

shrub 1 m. tall,
berries juicy, scarlet

May 16 - south end of
island, south of Kiyau;
On limestone soil
with outcrops of rock

37005 *Rhynchosia volubilis* Lour. ?
common

1 06 ~~Celastrus~~ *Celastrus gymnocarpa*
very common on rocks *diversifolia*

3 07 *Solidago japonica* var. *insularis* Kitam.
occasional in scrub

3 08 *Peperomia japonica* Makino
pocket in rough limestone

2 09 *Hedum formosum* N.E. Brown
common on rough limestone

7 10 *Emilia sonchifolia* (L.) DC.
common weed in sweet
potato patch

2 11 *Smilax sebana* Miq. det. T. Koyama 1959
occasional

4 12 *Rhamnus liulinensis* (Wels.) Koide
occasional

2 13 *Ficus retusa* var. *nitida* Thunb.
common

2 14 *Pittosporum tobira* (Willd.) Ait.
rare

4 15 *Ligustrum*
common

1 16 *Cynanchum* ~~formosum~~ *paniculatum* H. & A.
rare

1 17 *Cocculus trilobus* (Thunb.) DC.
rare

2 18 *Sida "rhombifolia"*
occasional

Kiyau

shimajiri-gun

OK? extensive twiner,
flowers yellow.
semi-prostrate,
flowers yellowish, fruit
pinkish.
flowers bright yellow.

Maximum

leaves and stems,
and spikes fleshy

common on
leaves fleshy.

OK

flowers bright rose
pink, somewhat
erect.

climber; fruit immature.

shrub; fruit immature

prostrate shrub

OK

shrub, fruit immature

shrub

twiner; flowers greenish
yellow.

twiness, flowers whitish

prostrate; flowers
orange.

- 37019 *Canavalia microcarpa*
 2 common on bare ground
 5 20 *Wedelia chinensis* (Oakes) Merr.
 common in open grassy
 ground
 3 21 *Viburnum awabaki* K. Koch
 occasional

May 19 - Between Awase
 meadows and Awase Air Field.
 Hills of a very stiff
 gray clay, rather bedded
 and greatly shattered,
 simulating a shale
 but very soft.

The vegetation here
 resembles that on limestone,
 with *Miscanthus* and
Cycas very prominent.

- 1 22 *Galium*
 common on overhanging
 banks.

May 19 - North of Enobi
 top of low ridge of deeply
 weathered mica-schist,
 the soil strongly laterized.

The vegetation here
 is very much degraded,
 reduced to a mixture
 of depauperate *Miscanthus*,
Galium, *Gleichenia linearis*,
Aristida, *Vaccinium*,

twining over ground
 and weeds. flowers rose pink
 flowers bright yellow.

small tree 3 m. tall
 fruit scarlet, not
 quite mature.

; Nabagami-gum

stems weak, pendent.

Lycopodium complanatum, *Asbeckia* (?),
Dianella, *Paspalum*
solidago, *Lebrunna*, *Cassytha*,
Pteridium, *Rhodomyrtus*,
Cassytha, and scattered
 small pines. A few other
 broad-leaf shrubs
 also common. The
 relative abundance of
 the principal plants observed

is as follows:

- a *Vaccinium*
- a *Glechoma linearis*
- f *Miscanthus*
- f *Pinus luchuensis*
- f *Gahnia*
- f *Aristida*
- c *Lycopodium cernuum*
- c *Osbeckia?*
- c *Paspalum*
- c *Lichina*
- c *Dianella*
- o *Rhodomyrtus tomentosa*
- o *Solidago*
- o *Cassytha filiformis*
- o *Pteridium aquilinum*

The pines are scattered, very small, 1-3 m. tall, up to 6 cm. dbh usually smaller.

May 19 - ~~Atsuta~~ North of Enobi; Nakagami - gum on top of sterile ridge on hard reddish soil, depauperate vegetation.

37023 *Paspalum orbiculare* G. Forst.

2 local in muddy spots

2 24 *Fimbristylis Thompsonii* Boeck. det. J.H. Kenn
local in and around muddy spots

1 25 *Pogonatherum crinitum* (Thunb.) Kunth
very local on slope.

On the sides of the ridge pines are more abundant and reach a somewhat larger size. The *Miscanthus* is more abundant and larger, as are *Lichina* and other shrubs.

There are also many more species of plants on these slopes than on the ridge.

This is representative of fairly large areas in this vicinity. In places the grass is more prominent and the pines smaller and less abundant.

on
2 chare

scattered culms or very loosely caespitose. very small tufts, culms ascending & spreading.

det. A.
chare

May 19 - in general area between Iha and Nakadomari, and isthmus to north and hills to south are fairly large areas of hilly land covered by low sparse *Miscanthus* with *Vaccinium*, *Gleichenia*, small pine seedlings, etc., on a red lateritic soil.

Animals. Lot 5 May 19
Bolo Point
land shells, living and sub-fossil, in pockets on high pitted limestone rocks at top of cliffs.

May 19 - Bolo Point; Nakagami-on and around jagged rough limestone

37026 *Berchemia* *linzota* DC.
abundant locally

27 *Ischaemum* *aureum* (H. & A.) Hack.
very local on vertical surface

28 *Phyllanthus* ?
common *Scaevola* *fluviogoides* M. & A.

37026 a *Crinia* *sonchifolia* (L.) DC.
rare
flowers purplish

May 19 - Bolo Point - this is a slightly rolling area, largely covered by grass - *Miscanthus* and *Imperata*. Around the edges ~~is~~ are the remnants of a rim of very rough pitted limestone. On this is a scrub of *Pandanus*, *Toddalia* and a number of other shrubs, or on the steeper and more jagged surfaces, a scattered vegetation of *Sedum*, *Peperomia*, *Portulaca okinawensis*, *Hedyotis* sp., *Ischaemum*, and several other small herbs and *Berchemia* and *Paederia*. The rock surface is almost honey-combed. Land snails are abundant.

gum

intricately branching prostrate shrub, close to limestone surface.
caespitose.

low shrub 3-4 dm. tall, branched at base; flowers white, fragrant.

- 37029 *Hedyotis*
in crevices and pits on
vertical surfaces
- 2 30 *Ischaemum* *crispum* var. *prostratum* (Hark.) Nakai
in depression in soil
back from rim.
- 2 31 *Ficus* *pyramidalis* A. Gray
in pits on vertical surfaces
- 1 32 *Portulaca okinawensis*
in pits on vertical surfaces
- 3 33 *Boehmeria nivea*
local *B. nipponensis* var. *lanceolata* (Thunb.)
- 1 34 *Ipomoea littoralis*
common

May 19 - Bolo Point Beach,
southwest of Masuya
on sand ridges back of
beach.

- 2 35 *Wedelia* *prostrata* (H. & A.) Hance
occasional
- 5 36 *Glehnia* *litorea* (L.) Schumacher
common
- 1 37 *Plantago* *asiatica* L.
roadside

prostrate; leaves
fleshy; flowers white.

(Hark.) Nakai
lit. A. Gray

prostrate, leaves
green above, pale beneath,
corolla violet.

prostrate, fleshy, roots
thick and rather tuberous;
leaves alternate, oblong;
flowers bright yellow
within, orange without,
stamens 20 or more.

depressed shrub,
short branches erect.
flowers magenta.

— Kunigami - Gun

prostrate, fleshy.
sagittate, flowers white,
fruit fleshy.
"shi'a bohu" or "shibo"
said to be used for tea to
treat cold or coughs.
leaves, ^{said to be} used ~~as~~ crushed
as poultice for sores.

May 19 - Bolo Point Beach

Ridges of lime-sand back of beach 1-2 m. high. The sand is being excavated and hauled away by truck. Also sweet potatoes are planted on some of the ridges.

Vitex rotundifolia forms mats on some of the ridges, also *Sporobolus pes-caprae*, ~~and~~ *Wedelia*, ~~and~~ *Ilex repens* forms extensive underground systems of stolons, as does *Convolvulus soldanella*. A grass, like *Sporobolus virginicus*, is abundant in places. A very large grass, probably *Spinifex littoreus*, is local and very extensively creeping. *Glehnia* is common, very deeply rooted.

May 21 - directly west of Okinawa are two small flat islets and a sand bar. The islets are green but can't make out any detail.

Southwest of these are several high islands.

Southwest of Okinawa a short distance is a tiny circular reef with a depression in center, most of reef shows some dry land at low tide, a small islet on north side, with beacon or marker, apparently always emerged, no vegetation apparent.

May 22 - ^{3 1/4 km. s. of Ozato}
~~1/2 mile n. of Moriyama~~

thin grassland

- 37038 *Uraria crinita* Desv.
 common locally in

May 22 - ~~1 1/2 mi. n. of Moriyama~~
^{just n. of Nisukun-mura,}
^{1.4 km. s.w. of Ozato}

- 39 *Blyxa* ~~crenata~~ (Herl.) Nakaii
^{aubertii Rich.}
 growing submerged, rooted
 in mud in paddy field.

May 22 - ~~1 mi. to n. of n. of~~
^{2 km. s.s.w. of Ozato}
~~Moriyama~~ s. of Nisukun-mura
 thin grassland

- 40 *Ernia souchifolia* (L.) DC.
 in disturbed grassland
 (forest plantation failure)
- 41 *Wahlenbergia* ~~gracilis~~ (Thunb.) A. DC.
^{marginata (Thunb.) A. DC.}
 occasional in
- 42 *Ernia souchifolia* (L.) DC.
 rare on eroded rocky place in
- 43 ~~(4)~~ *Justicia* ~~prostrata~~ var. *villosa* Yamam.
 rare on eroded rocky ground
- 44 *Cyperus* (Kyllinga) ^{H. cylindrica HBK.}
 rare on steep slope in
- 45 *Cyperus* (Kyllinga) *brevifolius*
 rare on steep slope in ^{H. brevifolia A. DC.}
- 46 *Aneilema*
 rare on steep slope in
Murdannia nudiflora (L.) Macbr.

60 m.

~~spike~~ racemes erect,
 flowers bright rose pink

det. C. den
 Hartog 1969
 (fresh)

flowering scape erect,
 flowers emerged, purple.

80 m.

flowers purplish,
 slightly exceeding
 involucre.

flowers blue

flowers pinkish purple,
 somewhat exceeding
 involucre

det.

E. C. Leonard

flowers purplish
 pink, lip deep maroon purple.
 heads whitish green.

heads green.

flowers purplish pink,
 2 large stamens with
 blue anthers, one slender
 staminode, 3 small
 stamens with yellowish
 deeply lobed anthers.

37047 *Paspalum orbiculare* G. Font.
common in

1 48 ~~*Bambusa*~~ *Hedyotis tenelliflora* Bl.
rare in

5 49 *Blumea hirsutifolia* (Dc.) Det.
common in T. Randeria 1958

0.5 km. s. of Musukun-Mum
May 22 - 0.2 mi. 32° w. of N.
2.3 km. s.w. of Ozeto
from Moriyama
open stony grassland

5 50 *Helicteres angustifolia*
common in

5 51 *Rosa bracteata* Wendl.
common in

3 52 *Eurya* *E. japonica* var.?
common near edge of
ravine in

1 53 *Cassia mimosoides*
rare in *C. bosciana* var. *pacifica* Dunn

2 54 *Fimbristylis*
rare in

1 55 ~~*Bambusa*~~ *Hedyotis tenelliflora* Bl.
rare in

5 56 ~~*Andropogon*~~ *Andropogon cristatus* var. *argenteus*
common, locally dominant in

2 ✓ 57 *Sorghastrum*
rare in *Sorghum nutans* (Vahl) Pers. (Hance)
com. or yel. without a distinct transverse

1 58 *Blumea*
rare in

1 59 ~~*Melastoma*~~ *Melastoma candida*
occasional in var. *motoban* (Bl.) Hance

Orchidaceae chinensis L.

slightly tufted.

corolla ~~flowers~~ white, calyx green.

erect, disk yellow

50 m.

spreading to ascending
from root crown; corolla
lavender.

procumbent shrub,
flowers white
erect shrub 2 m. tall,
(mostly lower), fruit
green.

flowers yellow

culms ascending

corolla ~~flowers~~ white, calyx

purplish.
tufted, erect.

(Staud.)

Hance - Hance

erect

det.
H. Hance

erect, disk yellow.

flower rose pink

May 22 0.5 km. s. of Nukunuma-Mura
 0.3 km. s. of Nukunuma-Mura
 7.7 km. s. w. of Ogata

~~from Marigasaki~~
 on large limestone
 boulders or remnants

37060
 3

Galium
 locally common

2

61 (~~Adiantum~~) *Gonolobus hirta* (Bl.) Miq.
 locally common

3

62 *Phaseolus*
 common

5

63 *Ampelopsis brevipedunculata*
 common (var. *maximowiczii* (Rehder) Rehder?)

1

64 (*Melastomaceae* *Polypodium scolopendria* Burm. f.)
 locally common

1

65 *Vernonia* *cinerea* (L.) Less.
 rare

2

66 *Callicarpa* *japonica* var. *lucida*
 local

1

67 *Emilia sonchifolia* (L.) DC.
 rare

2

68 *Leucas*
 occasional

1

69 *Cyperus* *appressatus* (L.) A. Ktze.
 occasional around base
 of boulders

5

70 *Pittosporum tobira* (Willd.) Ait.
 common

3

71 *Lygodium* (*Lygodium* (Thunberg) Sw.)
 common rooted in ground,
 climbing on boulders

50m

scattered in grassland.

prostrate to pendent,
 roots yellow, flowers
 green.

scrambling; flowers
 yellowish.

twining; flowers
 yellow, keel twisted.

climbing vine, flowers
 yellowish green, fruits
 immature.

rhizome bluish green.

Rehder.

sub-shrub; flowers
 pale lavender

flowers purplish,
 somewhat exceeding involucre.
 flowers white.

shrub 1.5 m. tall, fruit
 immature (two actual
 plants represented)

- 37071 *Raphidolepis lukianensis* (Mold.) Nakai
occasional
- 1 73 *Carmona retusa*
occasional *Chetia microphylla* Lam.
- 2 74 *Oxalis corniculata* L. sp.
common in pits and
crevices
- 5 75 *Dianella ensifolia* (L.) DC.
~~*ensifolia*~~
common

May 22 - 1 mi. 16° W. of N. of
Miyazama (1, 2, 3 on photo ²⁴⁵⁰⁻¹⁶)

- (1) Short, rather sparse
grass on gentle slope
extending out from foot
of small but steep hill.
The ground is only thinly
covered. *Imperata*, up to
knee high, is dominant,
mostly not so tall. There
is generally a strong
admixture of *Lygodium*,
the fronds only 1-3 dm.
long. ~~Locally~~ young
plants of a fern (probably
a species of *Thelypteris*) are
common to abundant
generally. There is some
Lespedeza cuneata and
a very little *Blumea*. Locally
Pteridium and *Gleichenia*

shrub 1 m. tall, rarely
fruiting, fruit immature.
Depressed shrub,
fruit ~~immature~~ red
when ripe.
flowers yellow.

flowers sky blue,
fruits bright dark
purplish blue when
ripe.

form patches (separately),
some rather large.

Small shrubs or
sprouts as scattered
generally, especially
Osbeckia.

Pits or "foxholes" are scattered
here and there - from the war.
These are characterized
by *Blechnum orientale*,
Ficus, ~~and~~ *Osbeckia*,
Gleichenia, etc.

This area has probably
been burned in relatively
recent time, though no
very obvious evidences
remain. The grass is
thinner than usual for *Imperata*.
Some ground is to be
seen between the tufts
of grass and other plants.

(1) Plants observed:

*Imperata**Rubus**Rosa**Thelypteris**Eygodium**Paspalum orbiculatum**Psidium guajava**Centella asiatica**Lactuca* sp.*Lespedeza cuneata**Desmodium* sp.*Chrysopogon aciculatum**Smilax**Osbeckia**Lcleria**Blumea**Pteridium**Gleichenia**Oxalis*

(2) On steep slopes ~~on~~ a tall dense stand of *Imperata* has been grubbed out in rows and left in rows, about 1-1.5 m. apart. The part left is dense and about 0.75 m. tall. In the cleared strips pine seedlings have been planted, or on lower slopes, *Acacia confusa* and *Casuarina*. The pines have mostly died. The *Imperata* is coming back here, along with *Eygodium*, *Lcleria*, and many other weeds.

This slope may not have been burned as recently as some of the others.

(3) A gentle slope at the foot of (2) is a mixture of *Imperata*, *Andropogon*, *Lcleria*, etc. with scattered small pine trees and with a rather thriving plantation of small *Casuarina* and *Acacia* saplings.

May 22 - 0.8 mi. 32° N. of n.
of Miyazama

(4)
(Photo
945-16)

Gently sloping terrace
of stony soil, in places,
at least, a gravelly clay.
On the surface are scattered
a few huge limestone
boulders and remnants.
This limestone is a very
rough pitted reef limestone.

The vegetation is a
thin grassland of Imperata
with some Andropogon,
Scleria, Fimbristylis, Cyperus,
Rhynchospora rubra, Setaria,
with scattered subshrubs
of Osbeckia, Rubus, ~~the~~ Helicteres
~~quinensis~~, ~~Lythraea~~ plant.
Rosa, etc. apparently sprouting
from rootstocks after burning.
Herbs such as Blumea, Centella,
Lespedeza cuneata, Cassia,
and especially Lygodium
scattered through the
grass. On small
escarpments and ravine
walls Andropogon
is most important grass.
Locally a few bushes of
Eurya.

Ravine bottoms are wet
and mostly occupied by
small paddy patches.

much
bare
earth
visible.

Here are various other
species of marsh plants
and weeds.

The limestone boulders
mostly lie on a surface
of schist or gravelly
clay. The limestone
has a very different
vegetation, mostly shrubby.
Three such boulders or
remnants were examined.
The following plants occurred
there, numbers indicating
how many of the boulders
each plant was seen on.

<i>Premna obtusifolia</i>	3
<i>Pittosporum tobira</i>	3
<i>Ampelopsis</i>	2
<i>Clematis</i>	1
<i>Oxalis corniculata</i>	3
<i>Ficus</i> (at least 4 spp.)	3
<i>Boehmeria niven</i>	3
<i>Morus</i> sp.	3
<i>Rubus</i> sp.	3
<i>Dianella ensifolia</i>	3
<i>Gynura</i>	2
<i>Wikstroemia</i>	3
<i>Herpa</i> ?	2
<i>Callicarpa</i>	2
<i>Bauhinia</i>	1
<i>Polypodium</i>	1
<i>Arenca</i>	2
<i>Leucas</i>	2

<i>Phyllanthus</i> sp.	1
<i>Cassia retusa</i>	2
<i>Artemisia</i>	1
<i>Lilium longiflorum</i>	1
<i>Cordia</i> <i>Cirsium</i>	2
<i>Phaseolus</i>	1
(<i>Melast.</i>)	1
<i>Rosa</i>	1
<i>Paederia</i>	1
<i>Eupatorium</i>	1
<i>Thelypteris</i>	1
<i>Trilisa</i>	1
<i>Galium</i>	1
<i>Miscanthus</i>	2

Numbers 1-4 are indicated
on photo 945-16.

May 23 - 1 km. n.w. of
mouth of Todoroki-gawa

(5) (photo 940-48) Low rolling
hills of schist or gravel
with schist boulders
and a few limestone
boulders on surface.
soil very stony.
The better spots are
cultivated, mostly
in sweet potatoes. The
ravine bottoms mostly
wet and in small paddy
fields.

This is a thin grassland
with much bare earth
visible. *Imperata* is a
minor component, with
Andropogon (2 spp.) and
Lygodium dominant, subshrubs
of *Psidium*, *Rosa*, *Rubus*, etc.
common. There are apparently
root sprouts from burred
off plants. The grass
is thinnest on stony hill-tops,
most luxuriant in hollows.
Here, if it is wet, as many
additional species. There
are patches where
Imperata is more common
than generally. Limestone
boulders have a shrubby
vegetation.

Plants seen in grassland
with their relative abundance:

- a Andropogon (2 spp.)
- a Lygodium
- f Chrysopogon aciculatum
- f Rosa
- f Psidium guajava
- c Blumea
- c Artemisia ~~sp.~~
- c Lespedeza cuneata
- c Centella asiatica
- lc Imperata cylindrica
- lc Vernonia
- o Rubus
- o Lilium longiflorum
- l small ~~lanceolate~~ acanth.
- o Evolvulus
- o Setaria
- o Paspalum
- o Uraria
- l Fimbristylis (monost.?)
- ~ Fimbristylis dichotoma
- ~ Cassia mimosoides
- ~ Cyperus (Kyllinga) sp.
- ~ Cyperus cyperinus?
- ~ Scleria
- ~ Wahlenbergia

May 24 1.2 km. ^{30° N. of mouth} of mouth
(6) (photo 940-48) of Todoroki-gawa

Essentially similar
situation to (5), lacking
limestone, schist actually
exposed on some hilltops.

Vegetation similar, perhaps
Imperata generally
more important.
Local differences in
relative abundance of
plants. Evolvulus frequent.

Helictes ~~Lythraea~~ (?) ~~substrat.~~
Hydrocotyle sp., Lactuca sp.,

same

(7) (photo 940-49)

~~Rough~~ Rough knobs of
schist, with a few tiny
remnants of very rough
limestone on top.

Shrubby vegetation scarcely
developed, but a few dwarfed
Premna, Ficus (2 spp.), Psidium,
Carmona, Morus, etc.

With tufts of Miscanthus
and Diarrhea. Some Paederia,
Phoradendron, Artemisia common.
Sida, Rosa, Pueraria
Vernonia, Rubus, Lygodium.

May 24 1.8 km. n. of Moriyama,
s. of Ozata

(8) (photo 945-14)

Gravel terrace with some large schist boulders. Dendritically dissected, the ravines with rice patches, but in upper reaches and small branches where the ravine is narrow and walls steep, they are filled with a mixed scrubby forest with *Ficus*, *Macaranga*, *Rhus*?, *Arenca*, *Pandanus*, *Angiopteris*, and various other shrubs and small trees.

The flat tops and steep sides of the terraces are mainly *Imperata* but with some other plants. Rather sparse with some soil showing.

May 24 ¹⁵~~18~~ km. n. of Moriyama
s. of Ozata

(9) (photo 945-14)

steep hills with *Imperata* cut into strips and pine planted but not thriving, as in (2) (May 22, p. 115)

May 24 ²~~18~~ km. n. of Moriyama,
s. of Ozata 20° n. of n. of
mouth of
Todoroki-gawa

(10) (photo 940-48)

rolling plain of rough limestone "pev" grassland somewhat grazed.

Characterized by *Imperata* in form of discrete bunches about 0.6-0.8 m. tall, not flowering, but each bunch sheltering several culms of *Paspalum orbiculare* making it appear that the ~~the~~ bunches are of *Paspalum*. The bunches are up to 2 m. apart or even more, usually 0.5-1 m. Often they are compound bunches, *Imperata* + *Psidium*, or *Imperata* + *Rosa*, or *Imperata* + *Psidium* + *Rosa*. *Rosa* and *Psidium* are very

Heavy
soil.

frequent. Between the bunches is a low sod-like ground cover of mixed herbs, prostrate Rosa, and grazed down grasses, with scab-like patches of rough limestone. The plants observed were:

- a Imperata cylindrica
- a Psidium guajava
- a Rosa
- a Hydrocotyle
- c Wikstroemia
- Verbena
- Paspalum orbiculare
- Paspalum scrobiculatum?
- Galium
- Wahlenbergia
- Setaria
- Stachys
- Chrysopsis
- Rubus
- Fimbristylis 2 spp.
- Plectranthus?
- r Vernonia
- c Centella asiatica
- o Digitalis chinensis
- o Lida
- o Oxalis corniculata
- n Cuscuta retusa
- Lippia nodiflora
- labiate acanth.
- Phaseolus

- Boehmeria
- ~~Carlina~~ Cirsium
- Digitalis henryi
- Blumea
- Torenia
- Lilium longifolium
- Trillium
- ~~Scilla~~ Apium?
- Eupatorium?
- Ampelopsis

A small sink hole is choked with Pandanus and some Macaranga, Morus, Alpinia speciosa, Toddalia, Boehmeria, Ampelopsis, Psidium, Ficus, Smilax, and a few other shrubs + vines, + ferns.

The Pandanus is ^{in habit} exactly that of Ceylon. When really ripe the fleshy part is swollen and pushes the keys apart. Largest heads about 15 x 22 cm. Spines more slender + appressed. Nearby lying on the limestone plain is a schist boulder about the size of a jeep. It is worn and rounded.

(11) (Photo 940-48)

small round hole in
schist - like a bomb crater.
Water in bottom with grass,
little woody vegetation.

12 (Photo 940-48)

Imperata grassland
with, on one rolling hill
abundant discrete bunches
of Andropogon. Other
similar hill adjacent
is Imperata without
Andropogon.

May 24 0.5 km. n. of mouth
of Todoroki-gawa

(17) (Photo 940-488 and 940-22)

remnants of rough
limestone on steep flat.
Undercut, very deeply
pitted.

Vegetation low,
nestling in pits, nothing
over about 0.5 m. tall.

Composition:

- a Zizia tenuifolia
- a Pemphis acidula
- a Ischaemum
- a Hedysotis albido-punctata
- c Lysimachia mauritiana
- f. Crinum
- d Messerschmidia argentea
- c Angelica
- o Lepturus repens
- r Pilea
- o Vitex

May 24 - 1.2 km. 30° w. of n. of
(6) mouth of Todoroki Gawa

50 m.

- short sparse grass
in rolling hills
- 37076 ~~metastachya~~ *gambusia hirta* (Bl.) Mig.
roadside ditch
- 5 77 *Rubus parvifolius* var. *triphyllus* (Thunb.) Nakai
common on roadside
banks (and on rock outcrops
and generally in grassland).
- 5 78 *Oxblechia chinensis*
~~can~~ Roadside bank
(common generally)
- 2 79 *Thelypteris goggilodur*
common in wet spot
in hollow, growing in mud
- 3 80 *Polypodium*
common in wet spot
in hollow, growing in mud.
- 5 81 *Paspalum* ~~delinckii~~ *G. Fordi*
common in small weedy
abandoned cultivated patch
- 4 82 *Centella asiatica* (L.) Urb.
common in small
weedy ~~abandoned~~ cultivated patch
- 1 83 ~~Isaria~~ *Mikasaena pygmaea* R. Br.
rare in disturbed ground
in weedy abandoned
cultivated patch
- 1 84 *Digitaria chinensis*
occasional in weedy
abandoned cultivated patch
- 2 85 *Setaria viridis* (L.) Beauv. (Brill. yellow)
occasional in weedy
abandoned cultivated patch

- weak herb, scrambling
in other vegetation
- procumbent, branches
ascending; fruit red, juicy
good flavor; receptacle
conical, orange.
- shrub up to 0.8 m. tall;
flowers bright rose
purple.
- rhizome creeping,
fronds erect, all seen
sterile.
- rhizome creeping,
fronds strictly erect.
- culms spreading
- prostrate, rhizomes
superficial.
- flowers white

culms spreading

- 37086 *Cyperus polytachyus* Nutt.
rare in weedy abandoned
cultivated patch
- 5 87 *Gynura* ^{*hirsutifolia* (L.) DC. var.}
common in weedy abandoned
cultivated patch.
- 5 88 *Sida* ^{*aurea* Burm. f.}
common in weedy
abandoned cultivated
patch
- 5 89 *Evolvulus* ^{*alsinoides* L.}
common generally on
stony slopes
- 1 90 *Lactuca* ^{*indica* var. *lasiocarpa* (Houtt.)}
occasional on stony slopes
- 5 91 *Wahlenbergia* ^{*marginata* (Thunb.)}
common generally
on stony slopes

May 24 2 km. 20° N. of n.
of mouth of Todokit-gawa

(10) rough coral plain,
pitted, heavy soil in pits,

- 1 92 *Vernonia cinerea* (L.) Less.
occasional
- 1 93 *Paspalum* ^{*orbiculare* G. Forst.}
occasional
- 1 94 *Galium*
occasional on rough rock
- 2 95 ~~*Stachys*~~ ^{*climacodum chinensis* L.}
occasional
- 1 96 *Paspalum* ^{*orbiculare* G. Forst.}
common, in bunches of *Imperata*

- *Cramocephalum* ^{*crepidioides* (Benth.) S. Moore}
erect, heads nodding,
dark rich red.
- prostrate, flowers
orange.
- prostrate; flowers
blue-violet.
- erect, flowers pale
yellowish-white.
- erect, flowers
blue-violet.

30 m.
with bunch grass (*Imperata*)

flowers purple

flowers greenish

flowers rose pink

erect

- 37097 *Fimbristylis monostachya* (L.) Hassk.
common in heavy soil
- 1 98 *Torilis japonica* (Houtt.) DC.
occasional
- 1 99 *Torilis*
occasional
- 37100 ~~*Colea*~~ *Salvia plebeia* R. Br.
occasional
- 1 01 ~~*Foeniculum*~~ *Lindera crataegifolia* (L.) F.
rare in heavy soil
- ~~5 02 *Pandanus tectorius* L.~~
- 5 02 *Hydrocotyle sibthorpioides* Lam.
common in heavy soil
- 5 03 *Dioscorea* *opposita* Thunb.
in sink hole
- 5 04 *Pandanus tectorius* L. var.
abundant in sink-hole

May 24 east coast,
0.5 km. n. of mouth of

- (13) ~~top~~ on pitted top of undercut remnant
of limestone platform
about 4-5 m above present
reef flat on which it stands.
- 05 *Messerschmidia argentea* (L.f.)
common

tufted

flowers white

erect aromatic herb,
collar blue-violet.
flowers purplish.

stem prostrate,
branches erect.
vine, twining on
other vegetation.
low twisted tree,
fruit ~~to~~ 15 by 20 cm.,
at maturity the pulpy
bases of keys greatly
swollen, separating
the apical hard parts.

4-5 m

Johnst.

depressed shrub, 0.5 m.
tall; leaves fleshy,
frosty appearing,
flowers white.

37106

Hedyotis

5

abundant ~~in~~ on
pitted surface

5

07

Pernphis acidula
abundantForsk.
Mstr.

2

08

Zoysia tenuifolia Willd.
abundant

5

09

Lysimachia mauritiana
common

Lam.

5

10

Lepturus repens var.
common

5

11

Ischaemum aureum (H. & A.) H. & A.
abundant

1

12

Limnium arbusculum (Max.) Mak.
local on most exposed
pitted surfaces

2

13

Pilea ~~populoides~~ H. & A.
local in pits

3

14

Crinum asiaticum var.
common on landward
side, ~~in~~ slightly
sheltered from spray.

May 25 - same

15

~~Cauphi~~ *Philoxerus wrightii* Hook. f.

undercut sides of small eroded

6

remnants of ~~reef~~ reef
rock and beach rock on
reef at or near high tide
level.leaves fleshy;
flowers whiteprostrate shrub;
flowers white

tufted; all seen sterile.

leaves fleshy, flowers
white, fruits reddish.
erectstems prostrate,
tips ascending.cushion plant,
leaves sub-fleshy;
all seen sterile.
stems fleshy, soft.rosette plant,
neck up to 20 cm or
more tall, thickest
at base somewhat
contracted upward.forming dense mats,
leaves fleshy; flowers
rose purple, stamens
opposite perianth parts.
ovary with 2 stigmas,
one seed, surrounded
at maturity by enlarged
fleshy disk.

May 25 - 0.5 km. s. of mouth
of Todoroki + Gawa

(14)

on slightly elevated shore
line with beach ridge
and low pitted limestone
bluffs and platform

37116 *Spiranthes littorea* (Burm. f.) Merr.
sandy beach

5 17 *Phaseolus*
sand on pitted limestone

E. akoto Fock. (Chamaejasme akoto (Fock.) Engl.)

8 18 *Euphorbia charnissensis*
seaward slope of sandy beach ridge,
very common.

1 19 *Ixeris japonica* Nakai
locally common on seaward
slopes of sandy beach ridge.

5 20 *Cirsium brevicaulis* var.
common in sand

5 21 *Ixeris repens* A. Gray
common on seaward
slopes of beach ridge and
on upper part of beach

1 22 *Cronopus wrightii* Hara
very rare on pitted limestone
cliff.

3 m.
det. A.
Chase

4 m.

prostrate, extensive
forming large loose mats.
prostrate, extensive
from deep root crown;
flowers yellow, keel
twisted.

4 m.

stems spreading,
slightly ascending,
lactiferous, leaves
pale beneath; involucres
glanous narrow, yellow-
green.

3 m.

rhizome buried in sand;
flowers yellow.

4 m.

flowers purple.

3 m. nk

extensively creeping
by long white succulent
underground rhizomes;
flowers yellow, leaf blades
and flower scapes only
above sand surface.

4 m.

flowers white.

- 37123 *Indigofera linkeana* Mak.
5 abundant on pitted limestone
- 5 24 *Zoysia matrella* (L.) Merr.
abundant on pitted limestone back from shore
- 1 25 *Alysicarpus vaginalis* (L.) DC.
rare on pitted limestone
- 1 26 *Fimbristylis cynosu*
rare on pitted limestone

May 25 - YCAT Compound
3 km. W.N.W. of center of Ishigaki City
In grassy area or "lawn"
around buildings

- 1 27 *Pectaria viridis* (L.) Beauv.
1 28 *Panicum paludosum* Roxb.
1 29 *Digitaria sanguinalis* (L.) Scop.
1 30 *Sporobolus elongatus* B. Br.
1 31 *Digitaria sanguinalis* (L.) Scop.

May 25 east coast, 0.5 km.
N. of mouth of Todoko-gawa

(13) Reef flat strewn with
boulders, ~~with~~ mostly
pitted limestone, some
very large, some schist.
Remnants of at least
two older reef surfaces
or planation surfaces
or platforms represented,
one by the 3 undercut remnants

4 m.



prostrate; flowers
red.

OK - A. Chane

OK

prostrate

OK

2 m.

det. A.
Chane

rhizomes deeply buried.

culms spreading
from root crown.

mentioned
~~described~~ previously, at
4-5 m. above present reef
flat, rough and uneven
on top, strongly undercut
on all sides, ~~and~~ and
by low bluffs on shore,
mostly covered by beach
ridge; another by a platform
at 1-1.5 m. very flat-topped.
A remnant, possibly of this,
but with ancient beach-
rock on top, at 1.5-2 m., undercut.

sample ^{later} taken of this beachrock by Helen Foster to have thin section made for examination of aragonite cement. Around undercut edges of this, under overhang, is a strange fleshy, densely matted or in cushions, apparently covered by highest tides. Another sterile dwarf shrub (37112) with it. Present reef flat represents third surface. On this are curious flat-bottomed rimmed basins, the bottoms of hard limestone with somewhat abraded surface, the rims, 3-6 cm. high, are of sandy limestone resembling beach-rock. These are common about midway between shore and the 3 large erosion remnants mentioned above. General surface, otherwise, very flat, except for occasional depressions. Many long or short cracks in reef flat, but these are rather irregular, rather than the straight or arcuate ones on atoll reefs.

May 25 - east coast,
0.5 km. s. of mouth of Todoroki-gawa.
(14) (photo 940.22)

Coast line of low pitted, often undercut limestone cliffs, 3-5 m. high, in places covered by a sand ridge. The reef where they are undercut is unusually abraded out, with many rounded boulders accumulated in reentrants. At its base is a rather smooth erosion ramp a few m. wide grading insensibly into the broad reef flat. On the flat are numerous boulders of limestone, of all sizes, very rough, sharp, and pitted, mostly concentrated near shore, scarcely any near reef margin. Reef flat very wide.

Cliffs with *Hedyotis* abundant in pits, also a few other plants. On top, where surface is exposed, ~~it is~~ rough and pitted, *Zoysia tenuifolia* is very abundant but does not completely cover ~~the~~ rocks. Back 30 or more

m. this is replaced by *Zoysia matrella*, *Scaevola* and *Messerschmidia* are scattered over this, in places forming a closed scrub. In open places *Indigofera linkei* is abundant, as well as prostrate *Pemphis acidula*. Back from the edge *Pandanus* makes up much of the scrub.

May 26 - north side of isthmus east of Yababu-lake

(18) (photo 950-124)

Cultivation on fine *Thiorya* sandy loam on flat land somewhat back of sea. This grades back toward higher land into a very dark fine loam, certainly like Arnold's series in color and in the pale sand underlying about 25 cm. of it. But much finer and siltier and apparently quite fertile. Sugar cane growing very well on it.

May 26 - 7.3 km. e. of Yababu-lake

(15) (photo 950-124) gravelly littoral Knoll on broken rock and gravel, well drained

Tall *Imperata*, up to 0.8-1 m tall, dense stand, with some scattered small tufts of *Miscanthus floridulus*, *Themeda*, *Pteridium*, *Artemisia*, *Lespedeza cuneata*, minor amounts of *Scleria*, *Lygodium*, *Osbeckia*, *Paspalum*, *Rubus*, *Ficus* (seedling), *Phaseolus*, *Desmodium*, *Lilium*, *Melast. (Lyzth.)*, *Wahlenbergia*, *Sorghastrum*, *Andropogon*, *Rubiate*, *Acacia confusa*, *Psidium*, *Rosa*, *Cyperus*, *Utraria*, *Lactuca*

This varies locally, some patches being very weedy, and with *Imperata* only in patches, indicating more recent cultivation.

Across road in thick *Imperata* are small spots where it has been cut or burned off. Here it looks just like the sparse grass on other side of island. In these spots the *Imperata* is flowering, not elsewhere.

May 27 - 3 km. n. of Banna-dake
~~at the~~ Nagura Valley
 (16) (Photo 945-92)

Patch of forest around
 shrine

Rather dense, canopy
 10-15 m., mainly of
 several species of *Ficus*
 which have compound
 trunks and large
 spreading, often umbrella-
 shaped crowns, ~~little or few~~
~~no evidence of~~ supporting
 trunks from large limbs.

Macaranga, *Melia*,
Melanolepis, etc. are
 also part of canopy.
Garcinia is planted
 along walk and to
 some extent is in the
 second story. A lower
 irregular second
 story made up ^{also} of
Evodia, *Pouteria*, *Ardisia*,
Diospyros, etc. *Morus*, *Diospyros*
 etc.

Under story of *Arenca*,
 in large clumps,
 the trunks up to 3-4 m.
 leaves to 5-6 m.

With this on the ground
 are *Alocasia*, ferns,
 etc.

Ardisia
Macaranga
Ficus 3-4 spp.
Morus
Pandanus
Arenca
Garcinia spicata
Melia azederach
Pouteria glomerata
Melanolepis?
Evodia
Alocasia cicutella
Asparagus conjugatum
Thelypteris acuta?
Citrus sp.
Pernna obtusifolia
Diospyros maritima

May 27 Shira + Mizer,
head ^{of the north branch} ~~of~~ Nagura ~~river~~ Valley
(17) (Photo 945-22)

flat valley bottom
being drained.

Deep peat soil or peaty
muck - rather jelly-
like but fibrous apparently with
judging by the piles ^{grass} roots.

May 27 - Shira Mizer Gawa,
~~headw. of Nagura Gawa~~
near headw. of north branch of
Nagura ~~valley~~

~~3777~~ in marsh on cleared peat
land, being drained.

37132 *Paspalum longifolium* Roxb.

abundant locally

6 33 *Hedyotis* *strobilata* *colymbosa* var.

abundant locally

2 34 *Panicum* *proliferum* Profl.
abundant

60 m.

60 m.

Lib. A. Just / near to Ryebyen fl.

culms erect

culms erect.

anifloro

net all -

flowers white

John W.
Dunlop

bluish green, erect.

- 37135 *Eriocaulon ~~majusculum~~ Koidz.*
common locally

May 27 - Nagura Valley,
1/2 mi. n.e. of Nagura, ^{1.5} km. n. of
in patch of dense forest
around shrine

- 5 36 *Macaranga ~~tamarina~~ (L.) M.-A.*
occasional

- 5 37 *Ficus ~~septica~~ Burm. f.*
occasional

- 3 38 *Alocasia cucullata*
abundant in undergrowth

- 5 39 *Melicope ~~auradum~~ (Hance.) Ohwi & Hance.*
Erodia
common in second story

- 2 40 *Pouteria ~~glauca~~ (R. Br.) Baill.*
rare in second story

- 5 41 *Ficus ~~Konishi~~ Hayata*
one seen.

- 42 *Bryopsis ~~laciniosa~~ (L.) Naud.*
Helotia
common in edges of forest

10 m.
Uranti Dake
Bananadake

small tree, fruit
bluish green with
soft bright green processes.
spreading tree,
compound trunk,
figs depressed globose,
immature.

stem to 0.5 m. tall, 3-4 cm.
thick; leaves glossy
green, at a slight angle
to petiole; spathe pale
green, ~~is~~ boat-shape
with round bottom.

odor faintly like durian.

small tree 6 m. tall,
buds white.

small tree, 6 m. tall,
leaves pale beneath.

large spreading tree
with complex trunk,
fruits on larger branches
extensive vine, with
disgusting odor when
crushed, ~~fruit~~ flower
greenish yellow; fruit
immature, green with white
stripes (red with white when ripe).

37143 *Ardisia sieboldii* Miq.
5 ~~small~~ edge of forest
44

5 H4 *Diospyros maritima* Bl.
edge of forest

same - cultivated field.

5 45 *Oryza sativa* L.
(dry land cultivation)

May 27 ~~Kan~~ ^{Fu} Saki
on chert cliffs exposed
to sea

2 46 *Hedyotis* ^{*oldenlandia cuneifolia* A. DC. and aff.}
in crevices

2 47 *Pouteria glomerata*
on top of cliff ^{*P. obovata* (R. Br.) Presl}

small tree; flowers
pinkish white; even
large branches snapping
off very readily ~~at~~
on abscission planes.
small tree; flowers
cream white.

ok
A. Chang

erect

5 m.

fleshy

low bush, under 1 m.
tall; leaves pale beneath.

May 28 - ~~1950~~¹⁹⁵¹ s.w. of Kabira

(19) ^(photo 950-45) Gulch bottom in forested area.

Mixed scrub 4-5 m tall, dense, forming a full canopy, tangled with vines, with ferns, Piper, Oplismenus, Alocasia, and many seedlings in undergrowth.

Main shrubs are Ardisia, Psychotria, Maesa, Arenga, Zanthoxylum, Crodia, Lasianthus, (Laurac), Boehmeria, Neolitsea

Vines - Flagellaria, Smilax, Caesalpinia, Piper, Elaeagnus, Lasianthus

Larger Ficus trees as emergents.

(20) Steep slope of side ravine - still a scrub forest but with general height perhaps 6-8 m. and more larger trees, mostly Ficus.

Undergrowth so dense as to necessitate a machete. Vines are bad, especially Smilax, the basal parts of which are somewhat prickly.

(21) Pine woods on steep slope - few other trees mixed in. pines are 10-20 cm. diam. 10-15 m. tall. Thin Miscanthus with shrubs covers ground. Many large boulders.

May 28 1.5-1.7 km. east
of Yoshikawa, ~~north coast~~
(22) (Photo 549-61) east of Kabira-ura
Low dense forest about
10 m. tall, full canopy,
trees mostly small,
trunks up to 20 cm.

rarely banyans with
complex trunks much
larger. *Ficus* is the
most abundant genus
in canopy layer. but
with some others.

Dense undergrowth
with ferns, *Psychotria*,
Urticaceae, *Lasiaanthus*,
Quercus, *Diospyros*,
Ardisia, ~~*Allophylus*~~
Alocasia,

abundant vines
Flegellaria, *Aristolochia*,
Caesalpinia, *Smilax*,
Piper, aroids.

ground bare in dense
parts, thinly covered
by dead leaves. *Piper*
vines, etc.

a few tall *Cyathea* one
tall *Livistona* seen.

This is on a sand
underlain by sandy
limestone which comes
to the surface frequently.
The reaction of the
sand is pH 7.5-8.
The situation is a
gently sloping terrace
dissected by broad
shallow ravines.

Some large old rotting
stumps in thick forest.

Stumps in clearing
1-5 m. apart, mostly 2-3 m.

In clearing a
rank second growth
1-3 m. tall or taller of
Melia, *Lipturus*, *Machanapa*,
Ficus, *Rhus*, *Nephrolepis*,
etc. tangled with *Cayratia*,
Vitis or *Ampelopsis*, *Caesalpinia*
(small stipules), *Clematis*.

Clavoscladus
Gonolobus
Canica

May 28 - ~~the~~ beach ^{west north} west
of YCAT Compound, west
northwest of Ishigaki City.
The beach ridge,
held in places by a
low sea wall, is covered
by a beach scrub,
quite dense, composed
of:

Scaevola sericea
Pandanus
Clerodendrum inerme
Hernandia sonora
Cherpesia populnea
Hibiscus tiliaceus
Wedelia biflora

at the edges and in
openings are

Vigna marina
Thuarea involuta
Ischaemum muticum
Digitaria sp.
Ipomoea pes-caprae

May 28 - ^{1.5 km.} ~~1.5 km.~~ S.W. of Kabira
0.5-~~1~~ km. S. of Mae Taki
in dense low ^{wet} scrub
forest in ravine

37148

5

Ficus benquetensis Merr. ~~?~~
common on steep slopes

5

49

Neolitsea
occasional

5

50

Bocconia ^{nearby wide pedunculata (Shimizu)}
~~occasional~~ occasional

2

51

Eurycorymbus ^{Melaleuca acutata (Hort.)}
occasional

2

52

Ardisia ~~coccinea~~
common ^{of richoldii Miq.}

3

53

Thapsia ^{ermata Nakai}
occasional

15

54

Thelypteris ^{lychnosus parviflorus (L.) Fernald}
common

5

55

Carmona retusa ^{phalaenophylla Lam.}
~~occasional~~ occasional

5

56

Ardisia ^{quinquefolia Bl.}
~~coccinea~~ common

5

57

Psychotria linkiuensis Hay.
very common in undergrowth

5

58

Lasiacanthus nigrescens (Masc.) Merr.
Lasiacanthus
common in undergrowth

40-60 m.

OK

small tree, fruits borne
only in dense hemispherical
clusters on the proximal
few cm. of the roots or
absolute base of stem,
immature.

shrub 2-3 m. tall,
fruit immature.

shrub ~~1.5 m.~~ 2 m. tall

shrub 2 m. tall

shrub 3 m. tall (other
taller); flowers pinkish
white.

shrub 3 m. tall; fruit
immature.

rhizome creeping, fronds
erect, arching at tips.

arching, semi-scrambling
shrub 3 m. tall; fruit
orange-red when ripe.

shrub 2.5 m. tall;
fruit immature

shrub 1.5 m. tall,
flowers greenish,
stigmas and stamens-
beards white.

shrub 1-1.5 m. tall; leaves
glossy, ~~prominently~~ prominently veined, above.

37159 *Maesa tenera* May
common

same - steep mountain
side, in forest

5 60) *Chloranthus lanandus glabra* (Thunb.) Nakai
rare

May 29 - 2.5 km. s.w. of
Kabira

(24, 25) (Photo 950-65)

Dense stand of young
pine with scattered older
pines, some admixture
locally of broad-leaf
species.

(26) (Photo 950-65) 2.5 km s.w.
same of Kabira

Ridges and slopes
with scattered pines
in thicket of broad-leaf
species.

shrub 2 m. tall,
fruit immature.

100 m.

shrub 1 m. tall,
fruit green. Green
wood with a very
pleasant resinous
odor when crushed.

May 29 - 1.8 km. s.w. of
Kabira

(27) (Photo 950-65)

Grassy steep ridge.
The grass is mainly
Imperata, moderately
dense, with scattered
pine seedlings 3-5 dm. tall,
rather abundant, and
scattered low bushes
of *Eurya*, *Glochidion*, *Ostelea*,
and several other species.

Vaccinium
Smilax
Rhododendron
Psidium

Dianella, *Evolvulus*,
Scleria, *Lygodium*,
Rhynchospora rubra,
Desmodium sp., *Labiata* acanth.,
Blumea, *Pteridium*,
Gleichenia, *Thelypteris*.
Some invasion of *Miscanthus*.
This ridge has evidently
been burned a couple of years
ago. Some charcoal in soil.

Up the ridge pines become frequent. One about 25 cm. and 1 about 20 cm. were recently cut. Some others still standing are about 30 cm. dbh. Those cut were about 35-40 years and 25 years respectively judging by rather unsatisfactory ring counts.

Here the ground cover becomes predominantly *Miscanthus*, with some *Imperata*, some *Ligularia* and less ^{numerous} but larger shrubs.

Ridge from peak to next peak covered by a low gnarled ridge-top scrub forest with habit of cloud forest but not mossy. Many genera represented whole not more than 4-5 m. tall.

Viburnum

Myrsine

Psychotria

Raphiolepis?

Podocarpus

several Lauraceae

Vaccinium

Antiderma

Dendropanax

Quercus

Distylium

(23) grassland with scattered pines, scattered small bushes - *Psidium*, ~~*Osbeckia*~~, *Rosa*, *Melastoma*

Imperata, *Sporobolus*, *Elephantopus mollis*, *Centella*, *Paspalum*, *Fimbristylis*, *Setaria*, *Lygodium*, *Cyperus*,

Ficus,

Secondary-thicket
perhaps 4 m. high,
of Pandanus, Glochidion,
a little Rhus(?) and Eurya
Mallotus + several
sterile shrubs.

Undergrowth in thinner
spots of Thelypteris
gigilodius, Alpinia
speciosa, Scleria,
2 spp of Lycopodium.

This is a wet low place.

May 29 - mouth of
Nagura-gawa
wet sand flats
covered by a pure
stand of Fimbristylis

May 29 - Beach southwest
of Nagura-gawa
sand ridge at top
of beach - covered by a
low scrub about 2-3
m. high of Scaevola,
Hibiscus, Pandanus,
Clerodendrum, Mesembryanthemum,
Morus, Miscanthus,
Canna.

Openings and a strip
at top of beach covered
by Ipomoea pes-caprae,
Vigna marina, Ischaemum,
Spinifex, Artemisia,
Thuarea, Wedelia,
Euphorbia, Jussiaea(?),
Vitex, Imperata, Cirsium
Rosa.

May 29 - coast 3 miles

n.w. of Nagura, ^{just s.e. of} Miyunohaki

37161

5

Angelica himalaica Maxim.?
common along seashore
on banks above salt marsh

~~May 29~~ May 29 - mouth of
Nagura + Gawa

7

62

Fimbristylis ^{formosensis} ~~valid~~
pure stand on wet sand
flat, inundated by tide.

May 29 - ^{2-2.3 km} ~~1.5 km~~ w.s.w. of
Kabira, 0.6-0.7 km. s. of Mae Take
swampy thicket

11

63

Glochidion ^{highlandense} ~~valid~~ M.A.
~~scrub tree 3-4 m. tall~~
co-dominant with *Pandanus*

6

64

Lygodium ^{condensum macrophyllum} (R.Br.)
climbing in edge of

same

in edge of dense young
pine woods

7

65

Wendlandia formosana Cow.

2

66

Phyllanthus
common

2

67

Forsydia
rare in trail

Indocalamus amabilis (L.) F. von Mull.

(over)

2 m.

F. japonica

A. 877

scape 1.2 m. tall, leaves
on fruiting plant dead,
leaves of specimen from
a sterile rosette nearby.

0 m.

OK J.H.
Kern

caespitose

60 m.

scrubby tree 3-4 m. tall;
flowers yellow.

H. japonica

60 m.

fronds twining, much
branched, pinnules
somewhat glaucous.

OK

shrub 3 m. tall,
flowers white
shrub 1.3 m. tall;
fruit red.

same - in grassy meadow
with scattered pines

37168 *Rhynchospora rubra* (Lam.) Makino
common

1 69 *Lilium longiflorum* Thunb.
rare

70 same -
on steep grassy slope
with scattered bushes
and pine seedlings

1 70 *Spathoglottis* *plicata* Bl.
rare

1 71 *Smilax* *china* v. *curva* J. K. Sasaki
common *Kumamoto - det. T. Koyama 1959*

1 72 *Blumea*
rare

5 73 *Dianella* *ensifolia* (L.) DC.
common

7 74 *Vaccinium* *wrightii* A. Gray
rare

2 75 *Glochidion* *obovatum* S. & Z.
common

1 76 ~~(det)~~ *Justicia procumbens* var. *rubicunda* Yano
occasional

same -
on steep grassy slope
among pines

77 *Rhododendron* *brassicifolium* Walld.
common

(over)

70 m.



ok

erect, flower horizontal,
white, fragrant.

125 m.

flowers magenta-purple

tangled shrub 1 m. tall,
fruit immature

flowers ~~to~~ deep strong
blue, segments, reflexed,
fruit dark blue.
shrub 0.7 m. tall;
fruit immature
shrub 0.3-0.4 m. tall;
flowers yellow.

flowers pink

140 m.

shrub 1 m. tall

same - in dwarfed
ridge-top forest

- 37178 *Daphniphyllum teijsmannii* (Lour.) Ohwi & Satake
occasional
- 5 79 *Viburnum japonicum* (Thunb.) Siebold
common
- 5 80 *Myrsine seguinii* Lour.
common
- 5 81
occasional
- 2 82 *Viburnum japonicum* (Thunb.) Siebold
common, edge of forest
- 7 83 *Vaccinium wrightii* A. Gray
edge of forest
- 2 84 *Itea fauriana* H. L. L.
rare
- 3 85 (~~leaves~~) *Amomum doodeballianum* Engl.
common
- 1 86 *Osmorhiza brevistylis* Matsum.
common
- 3 87 ~~*Psychotria*~~ *Tournefortia*
rare, edge of forest

200 m.

- small tree, fruit
immature
- shrub 3 m. tall,
fruit immature.
- small tree 4 m. tall,
fruit immature
- shrub, fruit immature.
- shrub 1 m. tall, fruit
immature
- bush 2 m. tall
fruit immature.
- small tree, 4 m. tall.
- small tree, leaves
very glaucous beneath.
- small tree, sterile.
- shrub 1 m. tall
buds greenish, unopened,
(slightly contorted?)

May 30 - head of north
fork of Naguro Valley, ^{mouth of} gully

(28) Secondary thicket
(Photo 940-12) 5 m. m. high, very
dense, on ravine terrace.
Schima, Trema, Cyathea,
Pandanus, Mallotus, Macaranga,
etc. stems slender,
not more than 8 cm.
rarely to 15 cm.

Polystichum, Gleichenia
forming loose underground
also another large fern.

Schima is most abundant.

(29) (Photo 950-12)

Soil a yellowish sand
underlain by clay.

Up the valley between
the two almost parallel
forks of the stream, the
thicket does not change
much, perhaps gets
taller, and species
become much more
numerous. The
ground gets less
sandy and more a
mixture of reddish
clay and rounded
large boulders.

After the ground rises
sufficiently that

deep dissection becomes
apparent Quercus
becomes rather abundant
and the secondary
species tend to drop
out.

Strangely enough,
to this point, at least,
Ficus is not common.

(29a)

(Photo
950-14)

Upstream the
forest reaches a
height of 10 m.
is quite mixed in
composition, with
Quercus common.
Trees mostly rather
small.

Bare looking spots
in photo are patches
of Dipteris glauca
and a little Miconia
on steep slopes.

May 30 - gulch of north^{east}
fork of Nagura-Gawa
in dense low scrubby forest.

- 37188 *Sphenomeris chinensis* (L.) Maxon
on wet rocks in gulch bottom
- 2 89 *Ficus erecta* Thunb.
rare in wet gulch bottom
- 2 90 *Podocarpus nagi* (Thunb.) Pilger
rare on wet gulch wall
- 3 91 *Callicarpa inermis* Maxim.
in wet gulch bottom
- 2 92 *Gynostemma podophyllum* (Hook.) Copl.
common on wet gulch wall
- 1 93 *Ardisia crenulata* Siebold & Miq.
occasional on wet gulch wall
- 1 94 *Alpinia* ~~sp.~~ *chinensis* (Willd.) Rose?
rare on wet gulch wall
- 1 95 *Ardisia sieboldii* Miq.
occasional in wet gulch bottom
- 3 96 *Psilotum nudum* (L.) Griseb.
epiphytic on tree trunk in
wet gulch bottom, rare.
- 1 97 *Ophioniza inflata* Maxim.
on wet rocks in gulch bottom
- 2 98 *Cyclosorus cuspidatus* (L.) Copl.
on wet rocks at bottom of deep
gulch
- 3 99 *Althya panicum* (Thunb.) Wight & Nees
in wet rocks at bottom of deep
gulch
- 37200 *Proraphia hamakiana* (Hayata) Makino
on wet rocks at bottom of
waterfall in deep gulch

above Dadifu

120-150
m.

large dense clump,
fronds arching, ascending
shrub, figs immature

sapling 1.5 m. tall, sterile
(other seen 3 m. tall).

ok. 4-11
m. tall

del.
C.V. 1100m

distinct trunk 4 dm. high
4-5 cm. thick.

shrub 2 m. tall,
flowers pinkish white.
flowers white, lip with
2 pink stripes; rhizome
with peppery odor, pleasant.
shrub 2.5 m. tall,
flowers pinkish white.

ok

fronds bent downward

dark green

- 37201 (rub.) *Lanceanthus plagiophyllus* Harms
5 common on wet rocks
in bottom of deep gulch
- 1 02 (rub)
rare on wet rocks in
bottom of deep gulch
- 03 *Eurya yagayamensis* Masam.
common in bottom
of wet gulch
- 6 04 ~~*Styrax*~~ *Achimandra yagayamensis* Ohwi, ex. char.
damp gulch bottom
- 1 05 *Korthalsella spinosa* (Thunb.) Merr.
damp gulch bottom,
parasitic on *Styrax* (37204)
- 1 06 (rub) ~~*Tachibana*~~ *yagayamensis* Malouin
rare in damp gulch bottom
along stream
- 6 07 ~~*Myrsine*~~ *Ternstroemia gymnanthera*
rare in damp gulch
bottom
- 5 08 *Gleichenia linearis* (Burm.) Underw.
var. *ferruginea*
common in damp gulch
- 3 09 *Saurauia tristylis* var. *oldhamii* (Hemsl.) Fin. & Gagn.
rare in damp gulch
same, below Dadifu
- 3 10 *Korthalsella spinosa* (Thunb.) Merr.
rare in gulch bottom
- 7 11 *Quercus cuspidata* Thunb.
common on slopes
Castanopsis cuspidata (Thunb.) Schott.

~~low~~ shrub; wood
foetid when crushed.

shrub 0.3 m. tall;
buds white.

small tree; leaves
convex; fruit immature.

100 m small tree, flowers
pinkish white
joints of branches flattened
in plane opposite that of
main ~~branch~~ stem.
shrub 0.5 m. tall,
flowers pink.

(W. & A.) *Bulbome* small tree; fruit
immature.

forming tangles

small spreading
tree, flowers pink.

60-80 m branches flattened in
plane opposite that of
stem.

fruit
immature. spreading tree 10 m.
tall, leaves with peculiar
bronze sheen beneath. I see no
reason for putting this in *Castanopsis*.

- 37212 (rare) *Randia canthioides* Champ.
rare on slopes
- 2 13 (rare) *Randia canthioides* Champ.
rare on stream terrace
- 5 14 *Claoxarpus sylvestris* var.
rare on stream terrace
- 2 15 (asclep.) *Cynanchum linkeianum* Wats.
rare on stream terrace
- 5 16 *Andisia glaucolegna* Bl.
occasional on stream terrace
- 4 17 *Psychotria linkeianensis*
occasional in undergrowth on stream terrace
- 5 18
common on stream terrace

May 31 - 2.5 km. S.W. of
Kabira

(30) (Photo 950-122)

Small hills, covered on north side with scattered pines in low secondary thicket, on south sides with *Miscanthus*, this also over the tops.

The thicket, of *Mallotus*, *Ficus*, *Glochidion*, *Saurau*, *Macaranga*, etc. with *Smilax*, *Ampelopsis*, and other vines, and with

- shrub 1 m. tall; fruit immature.
- shrub 2 m. tall.
- ellipticus (Thunb.) Hance
small tree 5 m. tall, buds only.
- wine with milky sap, fruit green. flowers maroon.
- small tree 3 m. tall,
- 40 m
shrub 1 m. tall, flowers pale greenish.
- small tree 5 m. tall.

a tall lanky growth of *Miscanthus* wherever the canopy is a bit loose.

Except where the canopy is very dense and at least 5 m. high this thicket is penetrated only with great labor. Ferns are numerous on the ground.

The *Miscanthus* on the summits and open slopes is about 3 m tall, very dense, can be pushed through, but with great expenditure of energy.

1956 Ryukyu Is.

May 31 ^{1.2 km} ~~3/4~~ mile south
of Kabira

(31) (Photo 950-65)

Small terrace, with
loose Miscanthus
a few pines, scattered
shrubs of various
sorts. Much
Gleichenia and Pteridium
some Pandanus.

Across road a plantation
of pines 10-15 cm dbh. &
~~8-10 m~~ 8-10 m tall.

Open beneath with
grass, ferns, Alocasia
and low shrubs.

Futaba, 1.2 km.
May 31 ~~3/4~~ mile south
of Kabira
in thin growth of
Miscanthus and bushes
on old terrace. ^{scattered}

- 37219 Eurya ^{japonica} ~~occasional~~ ^{var.?}
4 occasional ~~in~~
5 20 Itea ^{formosana} H. L. Li
occasional
7 21 Eurya ^{emarginata} (Thunb.) Makino?
occasional
6 22 Glochidion ^{obovatum} Sieb.
~~occasional~~ common
8 23 Mussaenda ^{yauyuanensis} (Munz) Merr.
common in thicket
(over)

40 m.

- shrub ~~1.5~~ 1.5 m. tall,
fruit immature.
- shrub 2.5 m. tall,
fruit dry.
- shrub 1.5 m. tall
leaves convex; fruit immature
- shrub 2 m. tall.

scandent shrub,
enlarged calyx lobes white,
caducous.

same - in undergrowth
in pine plantation

- 37224 *Pteris* *dispar* Kunze *P. semipinnata* var. *dispar* (Kunze) Baker
5 common
- 1 25 *Sarcandra* *glabra* (Thunb.) Nakai
rare
- 5 26 *Axonopus* *compressus* (Sw.) Beauv.
common
- 1 27 *Pteris* *actica* L. *P. nishikawensis* Tagawa
rare
- 1 28 *Pteris* *fournieri* Hieron.

May 31 - ^{3 km} ~~near~~ saw.
of Kabira, near Tsurutune Mori
in undergrowth in second-growth thicket

- 2 29 (int.) *Oreocnide* *pinnatifida* (Shinai) Maxon
occasional
- 2 30 ~~*Rhynchospora*~~ *ophiophylla* *hirsutissima* Hayata
rare in

Shira Hama, e. of Kera Saki
May 31 - ^{2.7 km} ~~near~~ n. w. of
Nagura along coast

- 5 31 *Cladium* *chinenses* Nees
forming pure stand
in marshy place
- 6 31a *Rhynchospora* *corymbosa*
in marshy place

70 m.

tufted

subshrub 0.5 m. tall,
filament fleshy,
enlarged.
culms spreading
from center.

det. C. V. Morton

100 m.

weak shrub 1.5 m. tall.

subshrub 0.5 m. tall,
flowers white.

2 m.

OK

ascending culms
~~connected by~~ from prostrate
rhizomes.

June 1

(32) (Photo 940-101)

Small patch of swamp forest in broad wet spot where small stream issues from base of mountains.

(33) Sloping ridge.

Between two deep ravines, of volcanic rock, basalt (?) below, breccia above.

Wooded but badly disturbed and logged out. Some fairly large trees 3-4 dm. dbh. but very crooked and not over 10-12 m. tall.

Numerous species, incl. some of *Ardisia*, *Camellia*, *Diospyros*, *Garcinia* spicata, etc.

Shrub layer pronounced but not hard to walk through. *Psychotria* common.

Vines, *Smilax*, etc.

common at low altitude but dropping out above. Many ferns.

This forest is quite ragged looking, with some secondary species such as *Mallotus* sp.

Almost no epiphytes except small liverworts, mosses and lichens.

Roche thinly mossy.

Ficus not abundant.

(34) (Photo 940-100)

Higher up on slopes just below Nozohu-Dake thicker woods, less disturbed, but much smaller trees, mostly less than 1 dm. dbh.

a few large *Ficus*, etc.

Some *Quercus*, *Podocarpus*. Canopy almost complete, about 10 m.

Undergrowth very low less than 1 m.

but luxuriant.

with *Sarcandra* and

Psychotria, many other shrubs, seedlings, many ferns, creeping aroids, etc. some *Arenaria*. Quite wet.

(35) (Photo 940-100)

Base of steep rock face
on north side of peak of
Nosoko+Dake. Bare
lava, shaded by trees,
wet, with a few ferns
and other herbs, including
a yellow-flowered *Lysimachia*.

June 1 - northwest slopes
of Nosoko+Dake.

in wet broad-leaf forest

37732 *Taraxacum*?

rare

1 33 *Garcinia* *spicata* Hook. f.
occasional ~~tree~~

1 34 *Gymnaphyllum* *variegatum* Presl
Pyrosia

on large boulder

5 35 *Psychotria* *serpens* L.
rare, one colony seen
on boulder

1 36 *Alpinia* *chirensis* (Willd.) Rose
rare

5 37 *Lysimachia* *rubromarginata* Miq.
local on base of steep
wet lava rock, shaded

3 38 *Peperomia* *javanica* Makino
rare on steep bare smooth
wet lava rock, shaded

1 39 (ach) *Calanthe* *furcata* Schl.
rare, terrestrial

200-230 m.

shrub 1 m. tall, buds whitish.

straight tree 8 m. tall, lower branches
sterile; flowers picked
up from ground
forming loose mat.

OK creeping, branches;
flowers white.

flowers white, lip with
2 pink stripes.
flowers clear yellow.

to stems ascending
fleshy, leaves fleshy,
pale beneath, dark green above.

flowers white.

June 1 - ridge northwest
from Nosoboko Dake
in degraded moist forest

37240 *Eurya*
5 local

5 41 (rub) *Loranthus japonicus* Tsch.
occasional

2 42 *Camellia japonica* var. *hirsuta*
occasional (Hayata) Yaman. 2 Mori

5 43 (grass) *Lophatherum gracile* Brongn.
rare along trail on
slope.

June 3 - Todoroki-gawa,
1.3 km. n.e. of mouth

Marsh on heavy fossiliferous
clay. ~~Potamogeton~~ most
abundant. *Eclipta*,
Wedelia, *Polygonum*, *Arcium*,
Cyperus spp., *Potentilla*,
Hydrocotyle, etc.
Heavily grazed. Hummocks
Water channels between
hummocks.

1.5 km. s.w. of mouth of
Todoroki-gawa

Trace of hard Ryukyuan
limestone underlain by
an argillaceous fossiliferous
limestone. Surface boulders
look to be arranged by
human agency. Collected fossils.

120-150

small tree 5 m. tall;

fruit immature

shrub 1.5 m. tall.

fruit fleshy, bright blue.

tree 10 m. tall, 1 dm. dbh.

dry fruit on tree.

det.
H. Jones

caespitose, ~~soft~~ panicles
stiff; roots tuberously
enlarged and clavate
distally.

June 3 - Todoroki-gawa, 1.3 km.
w. of mouth

Limestone cliff with fossil
bearing "cave"

Covered by thicket of *Melia*,
Ficus, *Mallotus*, *Erythrina*,
Hibiscus tiliaceus, etc.

Undergrowth of *Alocasia*.

Graciously vines common.

(*Clerodendrum*, *Pandanus*)

June 3 - 1.3 km. slightly
south of west of mouth
of Todoroki-gawa.
on roadside in cultivated
land.

37244 *Verbena officinalis* L.
common

2 45 *Cal. Cardiospermum halicacabum*
rare var. *microcarpum* (H. B. K.) Bl.

4 46 *Hibiscus abelmoschus*
occasional
Abelmoschus moschatus (L.) Medic.

same - in hummocky
marsh on heavy clay soil.

5 47 *Cyperus* *clausenoides* Kunth ^{OK T.H. Kun}
occasional to common

1 48 *Wedelia chinensis* (Oakes) Merr.
rare

1 49 *Potentilla yokusanensis* Makino
rare

1 50 *Polygonum barbatum* L.
occasional

1 51 *Cyperus brevifolius*
common *Kytlings brevifolia* Roth.

2 52 *Cyperus glaberrimus* All.
occasional

#7 53 *Isachne globosa* (Thunb.) Kunze
abundant, forming hummocks

same - on bank of Todoroki-gawa

#6 54 *Lambucus*
forming pure stand
on river bank

50 m.

flowers lavender

flowers white.

herb up to 1 m. long, ascending,
flowers light yellow,
stigmas dark maroon-black.

40 m.

single culms, erect, from
rhizomes.

flowers yellow

petals yellow

flowers greenish white.

heads green.

40 m.

40 m.

shrub or giant herb
2 m. tall, panicle flat,
flowers white.

same - in water in edge
of rice field

37255

3

Marsilea quadrifolia L.
common

June 3 - Todoroki + Gawa,
1.3 km. w. of mouth

thicket on and at base of
low limestone cliff

5 56

Mallotus ? no *Alchornea trewioides* M. R.

common in edges of

7 57

Capsicum frutescens L.
in undergrowth in

5 58

Ficus *virgata* Reinw.
common in

3 59

Vitis *parvifolia* Roxb.
climbing in

2 60

Clerodendrum *trichotomum* Thunb.
common in

June 3 - top of hill 1 km.
w. s. w. of Kara-lake

32 61

Bracharia villosa (Lam.) A. Camus
rare, with other grasses
on open hill top

40 m.

rhizome creeping on mud,
leaves floating.

50 m.

(*var. formosana* Pax?)

shrub 1 m. tall

shrub 1.5 m. tall, flowers
nodding, greenish white, stamens
dull blue; ripe fruit scarlet.

small spreading
tree, fruit ~~dark~~ dark red.
vine, in bud only, leaves
white beneath.

small tree, flowers
white with pink
stamens and red corolla
tube, calyx pale green.

136 m.

1st fl.
1st fl.

caespitose, culms spreading
at base, then ascending

193a 1956 Ryukyu Is.

June 3 - Hill 2 km. south
of Kara-dake

Hill of schist, with
black soil.

Covered by grass,
with a few shrubs of
2 species of *Eurya* and
Osteckia chinensis,
with *Dianella*, on
north side.

The grass is predom-
inantly *Imperata*, with
some admixture of
two species of *Andropogon*
and *Laspalum conjugatum*
and a few other species,
some *Miscanthus* at
the top. The *Imperata*
is mostly rather
luxuriant and
dense, well over knee
high in most places.
Evidence of light grazing.
Grazing pattern not
apparent. On a hill
nearby, fenced and
with much stock,
the grazing pattern is
very clear.

ASHICAKI ISLAND.

194

195

19 198

F.R. Fosberg
Collection box 44
begin with
no. 36925
mdeys

